AVIATION WEEK

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"We're ready to pour. Say 'when'!"

That might well be what the boom operator of this Boeing KC-97 flying tanker is saying, via radio, to the pilot of the Boeing B-47 Stratojet.

Because he knows the crew of the six-jet bomber wants to take aboard *just the right amount* of fuel to fit in with proper flight planning. No more – because it would mean useless weight. And certainly no less.

Helping to make sure they do get just the right amount are Honeywell *electronic* fuel gauges – the same kind of *really dependable* fuel gauges that are found in so many major types of aircraft today. Because of Honeywell's high engineering, research and material standards, Honeywell electronic fuel gauges have the highest degree of accuracy.

This is only one of many Honeywell products now in use by the aviation industry. We expect the list to grow longer in future years. Because automatic controls are so important to aviation progress. And Honeywell has been the leader in controls for more than 60 years.

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B.F.Goodrich

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Seal that saves muscle zips off to save time (1). In the Boeing B-17, seals were needed between elevator and stabilizer, rudder and stabilizer, and aileron and wing to make manual control easier. But with ordinary seals, hundreds of screws would have to be removed every time a control surface had to be taken off. B. F. Goodrich suggested Pressure Sealing Zippers for the flaps. Their molded rubber lips successfully prevented air flow through the hinge area. And mechanics unzip the flaps in seconds.

It lets men in—keeps fumes out (2). Keeping engine fumes out of a jet's cockpit called for a partition between cockpit and fuselage. But with a standard metal partition, mechanics would have to fuss with bolts or screws to get in for maintenance. BFG engineers' answer—a fume curtain sealed with a Pressure Sealing Zipper. The zipper's molded rubber lips provide a 100% effective seal. The curtain can be zipped open in seconds.

Shuts up torrent of hot air (3). Designers wanted to make the hot air duct in the Douglas C-124 in 6-foot sections.

They needed a strong, flexible coupling that would permit easy removal of the sections. B. F. Goodrich Pressure Sealing Zippers proved ideal. Their molded lips provide a 100% seal. They resist heat and damage, speed maintenance.

Pressure Sealing Zippers fit irregular shapes. Can be cemented. Save space and weight. Other B. F. Goodrich products for aviation include tires, wheels and brakes; heated rubber; De-Icers; Avtrim; inflatable seals; fuel cells; Plastilock adhesives; Rivnuts; accessories. *The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.*

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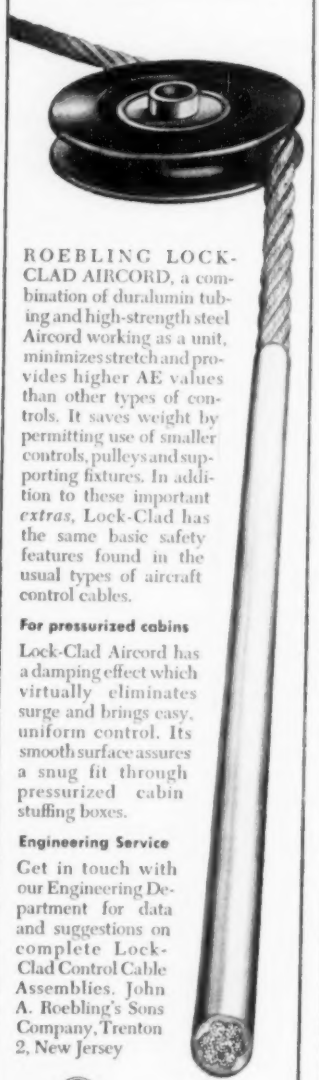

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Engineering Service

Get in touch with our Engineering Department for data and suggestions on complete Lock-Clad Control Cable Assemblies. John A. Roebling's Sons Company, Trenton 2, New Jersey

ROEBLING

Aviation Week

ABP Member ABC

Volume 56 — February 11, 1952 — Number 6

Headline News

Fund Slash Threatens Air Power 13
Air Safety Plans Spurred 14
Bunker Slated to Head Martin 15
CAA Reorganizes Safety Set-up 15
Marine Jets 16
SEC Reports Stock Transactions 17
Copter Developments 18

Financial

Carrier Report: Steady, Rising 21

Production Engineering

Forging Advances Cut Costs 22
NACA Money 26
More IAS Briefs 32
Slotted Flaps Slow Cessna 170 36

Equipment

Noise Muffler Fails to Impress 38
NACA Gloomy on Air Noise 38
Cal Central Likes Its 240-2 Fleet 44

Air Transport

Merger to Link Northwest, Capital 51
Common Fare for West Coast 52
Civil Air Training Aid Sought 54

Editorials

Magnificent 66
To Censor or Not? 66
What Goes On at CAA? 66

Departments

News Digest 7
Aviation Calendar 8
Picture Page 9
Who's Where 11
Industry Observer 11
Washington Roundup 12
New Aviation Products 48
Also on the Market 49
Shortlines 55
Cockpit Viewpoint 64
What's New 64

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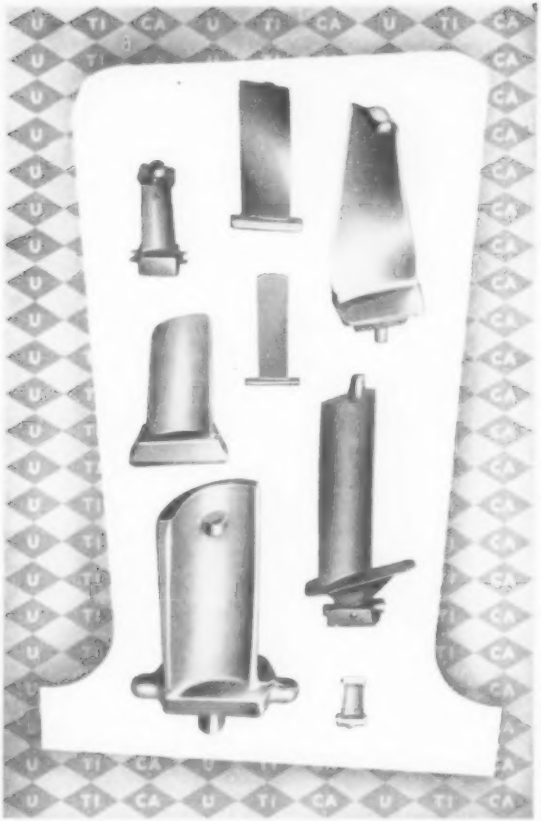

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NEWS DIGEST

DOMESTIC

Maj. Gen. Leon W. Johnson, commander of the 3d Air Force in England, has been summoned to take over the Continental Air Command at Mitchel Field, L. I., N. Y., replacing hospitalized Maj. Gen. Willis H. Hale.

Aero Commander light transport, built by Aero Design & Engineering Co., Oklahoma, has received its approved type certificate by CAA. Output of at least 100 is scheduled for this year.

Edward E. Slatters, Jr., CAB public information officer, was re-elected president of the Aero Club of Washington. Other officers: Edmund L. Becker, first vice president; Alexander McSurely, AVIATION WEEK, second vice president; Miss Pearl T. Robinson, third vice president; George B. Gelly, Douglas Aircraft Co.'s Washington representative, treasurer; and Bennett H. Griffin, Washington National Airport manager, secretary.

Spencer Crane, 86, who worked with the Wright brothers on their first airplane, died at his home in Syracuse, N. Y., Jan. 28.

William E. Valk has been re-elected president of the Manufacturers Aircraft Assn., which administers the patent cross-licensing agreement for the U. S. aircraft industry.

Civil aircraft exports (planes of 6,000 lb. or less) during 1951 totaled 433 valued at $3,105,848, compared with 415 units exported during 1950 valued at $2,252,795.

Paul M. Godelin, Chicago attorney and United Air Lines director for 18 years, died Jan. 31.

Harry K. Coffey, West Coast insurance executive and aviation veteran, has been elected president of the National Aeronautic Assn., succeeding Joseph T. Couting, Jr.

More than 350 airborne engine analyzers have been ordered from Sperry Gyroscope Co. by USAF, mainly for installation in Convair B-36F bombers and Douglas C-124 Globemaster 2 transports. The order boosts Sperry's total for the analyzer over 2,000.

Lawrence A. Razete, Electronics company official convicted in Dayton, Ohio, for procurement irregularities (AVIATION WEEK Feb. 4, p. 7), was denied a review of his case by U. S. Court of Appeals, and was ordered remanded into custody of a U. S. marshal. His attorneys plan an appeal to the Supreme Court.

FINANCIAL

United Air Lines has sold $10 million in debentures to help finance new equipment purchases. The debentures are for a 15-year term and carry a 3⅜% interest rate.

Hawaiian Airlines Ltd. reports that profits in 1951 were no better than 1941, despite a ten-fold gain in volume. Carrier made $32,859 on 34,045 passengers in 1941, but may show a loss for 1951 despite carrying 343,542 passengers. Increased taxes are blamed.

Aeroquip Corp., Jackson, Mich., reports net sales of $5,287,562 in first fiscal quarter ended Dec. 31, 1951. Net profit after taxes was $271,084.

Consolidated Vultee Aircraft Corp., San Diego, reports net profit after taxes of $7,750,524 for the fiscal year ended last Nov. 30. Net sales for the period were about $322 million. As of Nov. 30, Convair's backlog was about $900 million.

Waco Aircraft Co., Troy, Ohio, reports net sales of $967,953 for the year ended last Sept. 30, with net profit being $128,562.

Trans World Airlines' board has authorized an offer to stockholders to subscribe to one share of common for each ten shares held, at an offering price of $21.25 per share. Stockholders must be of record as of Feb. 27, or such later date as the registration statement becomes effective.

Resort Airlines has declared a 10% cash dividend payable Feb. 15 to holders of record on Feb. 5. A 20% cash dividend was declared by the carrier Dec. 15.

INTERNATIONAL

Canada will spend $1.5 billion to build more than 3,000 new military planes, mostly CF-100 Canuck and F-86 Sabre fighters, states Defense Minister Brooke Claxton. Claxton says that Avro Canada Orenda jet engine and CF-100 production are behind schedule, but are coming along and Canada expects to outfit a jet squadron every two months from now on.

TYPICAL PROBLEMS
Coming TMI Way:

"The medics want STAINLESS STEEL BONE SPLINTS... must be high strength, corrosion resistant and be infection-proof. What tubing...?"

"Can you make a STAINLESS tubing to operate at 1500 in our highly corrosive solution? It will double our production rate!"

"The nature of these Geiger Counters requires tubing that is machinable, non-magnetic and polished inside. It, of course, has a special electrical resistance?"

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Trim Trol

Model R-220

The huskier model TrimTrols—R-220 and R-174—are being used in increasing quantities where great strength and endurance are required. Rightly so. Although these models weigh only 3½ pounds, they have an ultimate static load capacity of 2,400 pound-inches and operate loads over 300 pound-inches through 160° rotation. Zero backlash, magnetic brake, adjustable limit switches, positive overtravel stops, adjustable position-indicating potentiometer, and built-in radio noise filter are features of these Trim-Trols.

Models R-220 and R-174 are identical in performance, but differ in mounting arrangements.

The newer, lighter TrimTrols—R-420 and R-422—weigh 2¼ pounds and have an ultimate capacity of 1,500 pound-inches.

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AVIATION CALENDAR

Feb. 13-15—Area Agricultural Aviation Conference, with unveiling of Ohio Project agricultural plane Feb. 15; headquarters at Seneca Hotel, Columbus, Ohio.

Feb. 14-15—MA National Aircraft Standards national meeting, Hollywood-Roosevelt Hotel, Los Angeles.

Feb. 19-20—Piper distributors meeting, Lock Haven, Pa.

Feb. 21—Institute of the Aeronautical Sciences Los Angeles section dinner meeting; speaker—Ivan Driggs, BuAer; Los Angeles.

Mar. 3-6—Institute of Radio Engineers, Waldorf-Astoria Hotel & Grand Central Palace, New York.

Mar. 3-7—Spring meeting of American Society for Testing Materials; symposium on testing metal powders and metal powder products, Hotel Statler, Cleveland.

Mar. 14—National Flight Propulsion Meeting, Institute of the Aeronautical Sciences, Cleveland.

Mar. 17-19—Second Midwestern Conference on Fluid Mechanics, to be held at Ohio State University.

Mar. 17-21—American Society of Tool Engineers industrial exposition and annual meeting. Theme: "Tooling for Security," Chicago. (For information, write Denham & Co., 812 Book Building, Detroit.)

Mar. 20—Institute of the Aeronautical Sciences Los Angeles section dinner meeting; speaker—Wellwood Beall, Boeing Airplane Co.; Los Angeles.

Mar. 20-21—Conference, Cooling of Airborne Electronic Equipment, to be held at Ohio State University in cooperation with USAF. Technical papers will be presented by AF, electronics and aircraft industries, and research organizations; Ohio State University, Columbus.

Mar. 30-Apr. 3—Convention of American Association of Airport Executives, Ft. Worth.

Apr. 3—Conference on safety problems of aviation, in conjunction with 22d annual Safety Convention of Greater New York Safety Council; Col. Gilbert E. Teal, USAF, will preside; Hotel Statler, New York.

Apr. 21-24—National Aeronautic Meeting and Aircraft Engineering Display, Society of Automotive Engineers, Hotel Statler, New York.

May 6—International Air Transport Assn., fifth annual technical conference, Copenhagen.

May 8-9—Fifth annual Wisconsin Aeronautics Conference, Green Bay.

May 12-14—National conference on airborne electronics, co-sponsored by Institute of Radio Engineers' Dayton section and Professional Group on Airborne Electronics, Dayton Biltmore Hotel, Dayton, Ohio.

May 14-16—Society for Experimental Stress Analysis spring meeting, Hotel Lincoln, Indianapolis.

PICTURE CREDITS

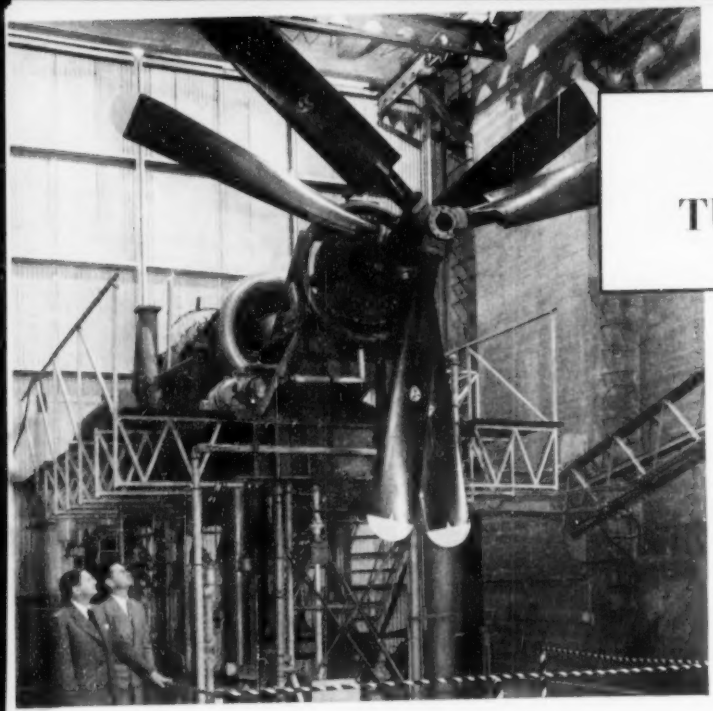
9—USN; 15—British Information Services; 16—Boeing Aircraft; 18—(top) McGraw-Hill World News (center) SBAC; (bottom) Tomecki Corp.; 29—Convair; 38, 41, 43—Howard Levy; 54—USAF.

NORTH AMERICAN FJ-2 FURY—NAA's Navy fighter completes cycle begun when straight-wing FJ-1 Fury was adapted to meet USAF interceptor needs after World War II—resulting in sweptwing F-86 Sabre series. New Fury resembles F-86, but will have folding wings and other modifications necessary for carrier operations. This and other scale models shown on this page were revealed recently on television by Assistant Secretary of Navy for Air Floberg who discussed Navy's air role.

New Navy Carrier Plane Models Shown

DOUGLAS XA3D-1—Biggest carrier type yet announced is this 77,000-lb. sweptwing twin-jet attack bomber (below), which is to fly soon. Its two underslung Westinghouse J-40 turbojets of over 8,000 lb. thrust each will give the plane a top speed in the "600-700-mph. class" says Navy. Crew numbers three. The A3D promises to figure importantly in new procurement since Air Force also plans to order large quantities, designated RB-66. Navy's version has folding wings to facilitate carrier storage.

GRUMMAN F9F-6 COUGAR—Scale display model of latest version of the famed Panther (below), with swept wings and horizontal tail, which is going into production at Bethpage, L. I. The Cougar is believed powered by P&W J-48 engine of approximately 6,250 lb. thrust, putting it over the 650-mph. mark. It succeeds the F9F-5 straightwing Panther, which had the same engine.



IN THE NEWS

TURBOPROPS

The Turbodyne, most powerful propeller-type aircraft powerplant in the country, delivers more than 8000 horsepower in addition to an undisclosed amount of thrust. Here, Jim LaPierre, manager of G-E's Aircraft Gas Turbine Divisions, and Virg Weaver, in charge of the Turbodyne project, take a look at the engine on the stand where it is undergoing rigorous tests.

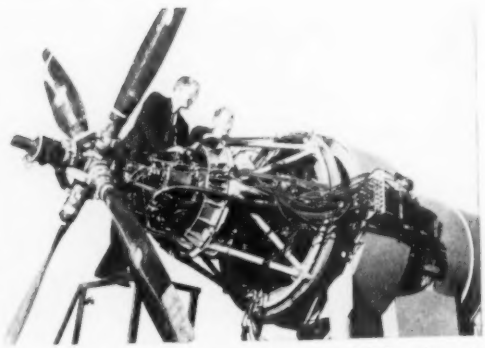
Ten years ago in July 1941, G-E [illegible] started work on a new type aircraft powerplant—an axial-flow gas turbine driving a propeller. This was the TG-100, the first turboprop in the country and the forerunner of future powerful engines.

General Electric engineers today are experimenting with the Turbodyne, a Northrop development. Although larger than required for today's transport needs, the Turbodyne presents an ideal vehicle for testing new ideas and methods.

New and improved turboprop engines are in the books at General Electric. Light weight and high powered, these engines will someday be lifting new aircraft to new uses and new records.

When you're considering powerplants, call in the company that pioneered the aircraft gas turbine industry. Telephone your General Electric aviation specialist, or write General Electric Company, Schenectady 5, N. Y.

Convair XP-81, first turboprop-powered aircraft to fly in U.S., powered by TG-100, first American turboprop.



Design engineers Alan Howard and C. J. Walker, inspect an early TG-100 turboprop on test stand in Schenectady.

AIRCRAFT GAS TURBINES

GENERAL ELECTRIC

210-22

WHO'S WHERE

In the Front Office

Col. Ray T. Elsmore has been appointed senior vice president of Transocean Air Lines, also chairman of the executive committee of the carrier's board. He was formerly executive vice president, a post now filled by **Samuel L. Wilson**, previously vice president-operations.

Charles J. Roggi is resigning as assistant to the president and director of the public affairs department of the Air Transport Assn. He has not announced his future plans. Roggi has held notable aviation posts for more than 15 years, his previous connections including American Airlines, Curtiss-Wright and Fairchild Engine & Airplane Corp.

Dr. John E. Rettaliata has been named president of Illinois Institute of Technology, succeeding **Dr. Henry T. Heald**, who has been nominated chancellor of New York University. Dr. Rettaliata previously was vice president and dean of engineering of the Institute.

Changes

George C. Trotter has been appointed sales manager for USAF equipment in General Electric Co.'s Electronics division, Syracuse, N. Y. Trotter joined GE in 1948, later became a project manager and assistant manager of the Air Force section.

D. W. Critchfield, formerly East Coast field representative for Aviation Products, Goodyear Tire & Rubber Co., has been transferred to Los Angeles as manager, Aviation Products, Western division. **A. M. Recker**, senior staffman in distributor sales, has been made head of the newly formed commercial sales department. **E. M. Humphrey** replaces Critchfield as N. Y. field representative and **K. J. Kernochan** will take over aviation product distributor sales in the Western division.

Samuel S. Olesky has been made chief engineer, research and development division of Reinforced Plastics Consultants & Engineers of Gardena, Calif. He was formerly head of the Radome Section, U. S. Naval Air Development Center, Johnsville, Pa.

Kenneth F. Hallinan has been appointed assistant Washington representative for Northrop Aircraft, Inc. He was previously in the company's military relations division.

Honors and Elections

D. S. Bixler, aviation sales manager of Sinclair Refining Co., N. Y., has been elected vice-chairman of the Aviation Advisory Committee of the American Petroleum Industries Committee. He has served on the Committee since January, 1945.

Maj. Gen. Edward M. Powers, USAF retired, has been elected to the board of Walter Kidde & Co., Inc., Belleville, N. J. He is vice president, director of engineering and a member of the board of Curtiss-Wright Corp.

INDUSTRY OBSERVER

► **Licensing agreement under which the 10-place Sikorsky S-55 helicopter (military H-19) will be built in France by SNCASE has been completed. Negotiations for a Sikorsky license have been underway intermittently since 1947. The French manufacturer is now producing the four-engine Armagnac transport, about the size of the Stratocruiser, and, under license, the de Havilland Vampire jet fighter. SNCASE is the second European licensee manufacturer for Sikorsky. Westland Aircraft Ltd. in Britain already is in production on S-55s.**

► One solution for C-46 power problems, being investigated by a U. S. operator of the Commando transports, is the auxiliary installation of a small gas turbine under the fuselage to give added power for takeoff and climb. A similar installation has been flown with a Douglas C-47 Dakota in France, but engineering details of the installation are not yet available.

► **Pentagon sources say chances for U. S. purchases of the Vickers four-jet Valiant bomber have receded to virtual vanishing point following loss of the prototype as a result of an engine fire in relighting tests in Britain (Aviation Week Jan. 28, p. 20). Absence of fire detector installations aft of the nacelle permitted the fire to get a start in the wing, it has been reported.**

► Latest de Havilland report indicates a total of 58 firm orders for Comet four-jet transports, with options for several more. Estimates are that the Comet's ultimate development limits will peg its cruising speed at around 520 mph. and its gross weight for takeoff at 120,000 lb.

► **Engineering complexity of the Boeing B-47B production line has continued to increase as accelerated flight tests of the new six-jet bomber continue to uncover new bugs. So numerous were change-orders that Boeing-Wichita has had to install what amounts to a second production line. Air Force, as a result, has ordered Boeing to end its "sick-bay." First modifications are to be taken over by Douglas-Tulsa and later by Grand Central at Tucson, Ariz.**

► General Electric is furnishing the electronic brain for tail armament of the new weaponless B-47. The armament system known as A5 has proved highly successful in recently completed tests and will begin to go into the plane in July, according to present timetables.

► **USAF feeling about the multiple refueling system developed by British Flight Refueling, Ltd., has changed recently. Opinion of some Air Force officials who favored the Boeing Flying Boom system has been reversed following extensive comparison evaluations. Evaluation concluded that Boeing system could handle only one aircraft at a time, while British system may handle up to three fighters simultaneously. Bulk, in-field maintenance and complexity of Boeing system are other factors which are expected to lead to adoption of a U. S.-modified version of the British system as standard for in-flight refueling.**

► The Westinghouse E-9 autopilot which is to go on the Lockheed L-94C may get a crack at stabilizing the Constellation. Lockheed is reported readying a trial installation. The transition may not be too difficult since the Constellation power boost system resembles that on L-94C, and the E-9 is designed to work integrally with L-94C boost. Some previous autopilot installations on Constellations resulted in boost-autopilot stability problems.

► **Marine air officials are making quiet inquiry to USAF for detailed engineering studies of the Chase XC-123 soon to go in production at the huge Kaiser Willow Run plant. Although general USAF cutback has resulted in slightly lowered total C-123 deliveries to USAF, overall program contemplates more than double original USAF estimated requirements for this assault transport. Navy procurement for Marine air requirement would increase present C-123 program by one-third, Air Force sources state.**

Washington Roundup

Air Industry vs. Election

Aircraft manufacturing industry seems to be a leaf that's going to be increasingly tossed about by powerful political forces in this Presidential election year.

These forces are: Labor and small business whose interests now appear generally to coincide with the biggest of big business, the well-intrenched automotive industry, and other civilian industries, adding force to their drive for—

A further stretch-out of the aircraft program, which accounts for over half of defense procurement. On this: • General Motors Corp. President Charles E. Wilson's comment: "We don't want to threaten Russia by producing a big war machine and crowd a war on the world." • American Federation of Labor's Executive Committee objected that Air Force is "trying to reach the moon" in its procurement program, called for establishment of a civilian board on military requirements to hold them down—labor to be represented on the board.

Civilian Economy

Key factor here is:

• Aircraft industry has been on a build-up. When the build-up moves more slowly, it means, in general, that workers who might have been hired won't be, and that small businesses that had obtained subcontracts may have them canceled.

But, the blow to labor and small business hits home harder when materials allocations to the civilian economy are cut off. Men are laid off wholesale and small firms' operations are curtailed until, and if, they can readjust into the defense program. The Administration's proposed retrenchment in the giant automotive industry, for example, reverberated throughout the economy down to salesmen. And so, it's largely been called off for now.

On the score of getting critical materials for civilian work, labor and small business seem to be getting their way. Last week Defense Production Administrator Manly Fleischmann confirmed that between 20 to 40 million lb. of aluminum would be stripped off USAF's customers' second quarter allowance. A substantial part of it is to be channeled into the automotive industry. Michigan's Sen. Blair Moody anticipated this would enable production of the "ceiling amount of cars."

More Contracts Later

Congress of Industrial Organization's spokesman, Walter Reuther, put it:

"Channeling scarce materials into civilian production is only a secondary consideration. The primary consideration is to get defense contracts into our civilian automotive plants to replace civilian production."

Reuther's powerful CIO-UAW wants to cut down on plant expansion for aircraft production. On this, labor's path crosses up the automotive industry, willing to expand capacity throughout the country. The union wants aircraft produced in auto plants, as auto production is tapered off, to secure employment.

But the auto firms part company with the union here. They're ready to set up separate facilities for production.

R. E. Gillmor, chairman of Defense Mobilizer Charles Wilson's "task force," last week forecast:

Between now and June he saw no more than the prospect of channeling $400 million in defense contracts into the automotive industry.

But after the enactment of the 1953 fiscal year budget, he anticipated contracts would flow into auto firms.

Political Football

The issue of more or less air power is going to be bandied about in this session of Congress starting soon.

The Administration is going to starve the aircraft program to take care of civilian industries from now to November.

There may be much talking in the opposite direction by Administration spokesmen, though.

Here's how Congressional debating on air power, much of it making headlines, is likely to go:

• **House and Senate Appropriations Committees**—They are out to cut the President's $27 billion recommendation for USAF and Naval aviation.

Chairman George Mahon of the House Subcommittee has sent out letters to his some 450 colleagues urging them to submit recommendations on ways and means to do it.

Sen. Joseph O'Mahoney touched the theme for his subcommittee's approach: "Preserving a sound economy is our strongest defense against Russia. Spending into bankruptcy for military defense is our best way to make ourselves defenseless."

These are the two key committees on air power build-up. They decide on how much cash.

• **Senate Preparedness Committee,** headed by Sen. Lyndon Johnson, will issue another blast in the near future against the slow-up of the air power program.

But that is all this Committee can do: blast.

• **The big debate on air power,** though, likely will emerge from Senate Armed Services Committee.

It'll be a 1952 revised version of last year's "great debate" on air-sea power vs. dispatch of troops to Europe to hold that land area.

Republicans will spark it. If the flame is quenched by Sen. Richard Russell, chairman of the Senate Armed Services Committee, it'll break out in Senate floor oratory.

USAF's Chief of Staff Gen. Hoyt Vandenberg's statements will be ammunition for the inquiry.

Republicans will query: Why is it, after the billions and billions of dollars laid out for defense, this member of the Joint Chiefs of Staff reports that the U. S. is lagging behind Russia on air power?

The Hoover-MacArthur sea-air power Republicans are promoting the probe.

Meanwhile, though, the U. S. is moving in the opposite direction: more land to hold. Senate is going to confirm treaties which will obligate the U. S. to "hold" against land invasion, not only the continent of Europe, but also Greece and Turkey.

► **State Dept.'s Position**—State Department is the spark behind current publicity on the increasing rise of Russian air power over U. S. air power.

State Dept. doesn't like Defense Mobilization Director Wilson's cutbacks in the aircraft program to channel material into auto and other civilian production.

Top State Dept. officials are telling the President that if he wants U. S. diplomacy to have a strong arm, he's got to stop coddling the home front industries and put some jet power behind aircraft production.

—Katherine Johnsen

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Slash in Funds Threatens U. S. Air Power

- **Parallel is drawn between political implications of current election year cuts and those of 4 years ago.**
- **Nation's air build-up, which took a severe beating in 'muscle-trimming' days, again suffers most heavily.**
- **Peak AF aircraft programs scaled down an average of 30%, engines even more; Navy takes 15-20% cut.**

By Alexander McSurely

The severe slashing of U. S. military aircraft programs resulting from the reduced 1953 military budget is being described by some informed Washington observers as the most brutal sudden reduction in air power inflicted on the U. S. since the "muscle-trimming days" of former Defense Secretary Louis Johnson.

Over $7 billion of the total of $19 billion cut from the 1953 defense budget was subtracted directly out of Air Force hardgoods procurement funds, official sources told AVIATION WEEK. (The $19-billion cut was cited by Defense Secretary Robert Lovett in testimony to Congress as the difference between what Joint Chiefs of Staff asked for—$71 billion—and what the Bureau of the Budget and President Truman finally approved—$52 billion.)

Informed observers calculated that, overall, the scaling-down of peak production programs for the Air Force averaged for aircraft, by units, 30% and for engines much higher. Navy air's program peak levels were cut, by units, 15-20%.

▶ **1948 Parallel**—Washington observers drew a parallel between political expediency of the slashes in the forthcoming defense budget in a presidential election year and the political angles which surrounded the Louis Johnson cutbacks in air power in 1948, another election year.

The Johnson cutbacks have been blamed in Congress for the weakened U. S. national defense which in many observers' opinions led to the Korean crisis. The new cutbacks in the present international situation are being watched for a similar effect.

New details of how the cutbacks affect plane and engine programs:

• **Glenn L. Martin Co.'s** Canberra B-57A light jet bomber program, which was scheduled to hit a peak and level off production at more than 45 planes a month, has now been trimmed to less than 20 planes a month.

• **Chevrolet division's** N. Tonawanda, N. Y., program to build Wright R-3350 engines in a plant where the company turned out 65,000 aircraft engines in World War II has been pared to only 20 engines a month for its level-out period. Chances appear good that the plant will be closed completely and held in standby condition.

(Reports are that the whole Wright R-3350 program has been cut back to 40% of its planned peak level.)

• **Ford Aircraft Engine division's** new $30 million planning contract to make Pratt & Whitney J-57 jet engines at Chicago (AVIATION WEEK Feb. 4, p. 15) is specifically programmed to spread some of the cost of operating the giant Chicago facility over the jet engine, due to the fact that the Pratt & Whitney R-4360 engine, for which the plant is now tooling, is being phased out of production at a new earlier date. It was learned that the licensing agreement between Ford and Pratt & Whitney for the J-57 was still under negotiation last week and has not been completed.

AF Chief to Quit?

Reports are that Air Force Chief of Staff Gen. Hoyt Sanford Vandenberg will resign when his present tour of duty expires 12:00 noon, Apr. 30, 1952.

Sources close to him report his health a factor and, significantly, that it is customary for a military chief of staff to be notified by the President six months in advance that his services are desired for another term. So far, these sources state, such notification has not been received.

▶ **Verbal Contracts**—One explanation for the cutbacks in 1953 schedules goes back to the early days of the Korean crisis in mid-1950 and the first build-up program that followed.

Military services and particularly USAF, eager to get enlarged programs rolling and conscious of the long lead times on many items, issued letters of intent and various forms of commitments to manufacturers without the full cash authorization to back them up. Instead they had verbal go-aheads from Congress that more funds would be forthcoming.

A high Air Force officer told AVIATION WEEK early in 1951 that many USAF procurement commitments were strictly on a down payment basis. He knew of some substantial contracts where as much as 30% down payment was provided for; others were in smaller amounts, but complete payments were being made on some small contracts for government-furnished property (accessories, etc.).

▶ **Political Necessity**—But the verbal go-aheads on the programs of 1950 did not reckon with the political necessity for holding the lid on the budget in a presidential election year. Now as additional payments become due they have to be taken out of available 1953 funds, or programs have to be cut so that funds will meet commitments.

Another factor cited officially as an explanation for some of the engine cutbacks is the increasing reliability of U. S. jet engines as demonstrated by both combat and non-combat experience.

With overhaul periods increasing on the standard U. S. jet engines, such as the GE J-47 and the Allison J-35 and J-33, the number of spare engines and spare components required per airplane is considerably less. Whether this reliability factor is entirely responsible for the cut in spares or whether the element of calculated risk, which has governed the entire cutback program, also enters in has not been speeded out.

▶ **Transport Cuts**—Cutbacks on the piston engine programs are attributed largely to the heavy cuts that hit the military transport (AVIATION WEEK Jan. 21, p. 13) and the trainer programs, it was learned.

Reduction of approximately 40% has been made in the Douglas C-124A transport scheduled peak production. However, the large new Air Force order for

B-66 planes, new Air Force version of the Navy A3D twin-jet bomber, is expected to ease the shock of C-124 losses.

The fact that the Boeing C-97 transport production peak schedule has been virtually untouched in the general cutbacks may be explained by the touchy Seattle labor situation which has affected other Air Force decisions in the past.

Still clouded is the fate of the thousands of contracts for small aircraft accessories and components for aircraft and engines which are being cut back. But obviously these contracts cannot be expected to run as usual, either.

CAB Revises Seat Safety Regulations

Manufacturers of future transport types will have to build their aircraft in conformance with a new detailed revision of Civil Air Regulations put out by Civil Aeronautics Board last week.

The amended Airworthiness Regulations affect transport certification applied for after Jan. 28, the effective date. The Douglas DC-7, latest type announced, thus escapes the new requirements.

The passenger seating amendment requires set and bunk structure that can stand a crash load of nine times gravity without breaking; previous minimum load has been six times gravity. In addition, CAB this time has specified that the seat fittings and belts must be even stronger—12 G.

The 25 pages of amended regulations announced last week are the result of over a year's industry-government review of present and proposed amendments.

WADC Personnel

Dayton—Assignment of two generals and promotion recommendations for four colonels highlighted recent military news at Wright-Patterson AFB.

Assigned are Brig. Gen. Clyde H. Mitchell as special assistant to the director of procurement and production, and Brig. Gen. James L. Riley as deputy to the chief of the supply division. Both previously were assigned to Continental Air Command.

President Truman has recommended for promotion to brigadier general:

- **Col. George W. Goddard,** chief of the photo reconnaissance laboratory at Wright Air Development Center.
- **Col. Kern D. Metzger,** chief of the industrial resources division at Air Materiel Command.
- **Col. Albert G. Hewitt,** deputy chief of the maintenance and engineering division of AMC.
- **Col. Clarence P. Talbot,** deputy for operations in the directorate of supplies, services, maintenance and engineering of AMC.

Air Transport Safety Plans Spurred

Continued national publicity on recent air crashes spurred additional work on air transport safety programs last week.

House and Senate investigators focused on immediate remedies for noise and over-city approaches around Newark Airport. Meanwhile a committee of top government and airline experts met in Washington last week to reexamine their navigation safety programs in development of airborne radar, radio altimeters and pictorial navigator equipment.

Some airline managements talked of doing more about transport cockpit standardization and streamlining, one plan was to wire pilot radio channel selectors so the pilot is sure to hear the airport radar monitor reports.

Observers comment that these plans may lead ultimately to revised government and airline attention and budgeting for greater air safety.

▶ **Congressional Recommendations**—Two recent crashes in the heavily populated area of Elizabeth, N. J. fatal to 86, have prompted strong Congressional interest in safety around airports.

- House Interstate and Foreign Commerce Committee organized a subcommittee, headed by Rep. Lindley Beckworth, to make a thorough study of the subject. Other members: Rep. Arthur Klein, Rep. F. Ertel Carlyle, Rep. Charles Wolverton and Rep. Carl Hinshaw.
- Senate Interstate and Foreign Commerce Committee announced its professional staff will investigate all major air crashes from now on.
- A report by the Senate group on Newark proposed that "closing of the airport is obviously action that should be taken only if no other satisfactory way can be found to protect the citizens living in the vicinity" but urged that projects and plans to eliminate aircraft noises and hazards be expedited.

▶ **Six-Point Program**—For improvement of safety at the airport, the committee recommended:

- Expedite the completion of the new instrument Runway No. 4.
- Designate Runway No. 10 as the first priority runway for landings and take-offs when weather permits.
- Examine, and if possible raise, the crosswind component for runway use.
- Adopt radar direction as the required departure procedure at Newark for instrument weather as soon as technical equipment is ready.
- Encourage the practice of making low altitude turns after take-offs to avoid congested areas whenever the safety of flight will not be endangered.
- Raise the instrument weather minimums to a ceiling of 500 ft. and one mile visibility until such time as the new instrument Runway No. 4 is operational.

▶ **Radar, Altimeters and Pictures**—The committee of navigation experts that met last week is the military-civil air coordinating committee's "Special Working Group No. 10."

Bad weather has caused most recent fatalities—planes have flown into hills the pilots thought were somewhere else. This situation recently led CAA Administrator Charles F. Horne to suggest a special ACC working group to study the radio altimeter or terrain warning indicators available.

The idea grew as other experts brought radar and other navigating instruments into the re-examination program. Only thing definitely decided so far is that the terrain warners currently available aren't the final answer, but experts expect a constructive set-up in airline safety development programs will grow out of last week's and later meetings of the special working group.

A high airline official says airlines will order equipment like radar "when manufacturers have developed them to the point of reliability where the product carries a reasonable guarantee." He said that the day is not far off when radio altimeters, radar, and pictorial computer navigators will be ready for airlines to order. Hence the renewed interest in them, especially spurred by the rash of navigation accidents.

▶ **Cockpits**—Cockpit engineering may become one of the safety programs it's been urged by the Air Line Pilots Assn. ever since the President's Air Safety Board investigation in 1947.

Meanwhile, nonscheduled airlines felt their toughest economic blow when CAB clamped down with its 5,000-lb. weight reduction order for passenger-carrying Curtiss C-46 transports.

Nonsked airlines operate 75 C-46s at gross weights up to 48,000 lb., now cut to a maximum of 43,000 lb. by CAB's "emergency regulation." Nonsked spokesmen say it is equivalent to a 30% cut in payload.

Counsel for the nonskeds failed to obtain an injunction against the CAB order, but immediately took their case to the U. S. Court of Appeals and indicated they would go to the Supreme Court if necessary. They based their appeal on the claim CAB does not have authority to issue such a regulation without prior notice and hearing.

However, CAB does have power to issue emergency safety regulations without notice. The Board cited two general reasons for its order: increased safety in operations of the C-46 and the 82 fatalities in two recent C-46 accidents.

Bunker Slated to Head Martin

Pullman executive reportedly supported by Mellon interests in aircraft firm's reorganization.

Two Pullman Co. executives are likely to move into Glenn L. Martin Co. management picture.

George M. Bunker, president of Trailmobile, Inc., Cincinnati, reportedly was being selected last week as the new head of the Glenn L. Martin Co.

At AVIATION WEEK deadline there was no confirmation that a contract had yet been signed; but reports were current in Wall Street that Bunker had been nominated by the Mellon banking interests, to bring the financially ailing airplane company back to health.

►**Business Doctor**—As president of Trailmobile, a division of the Pullman Co., and in some other industrial assignments, Bunker is credited with demonstrating his ability to resuscitate sick businesses.

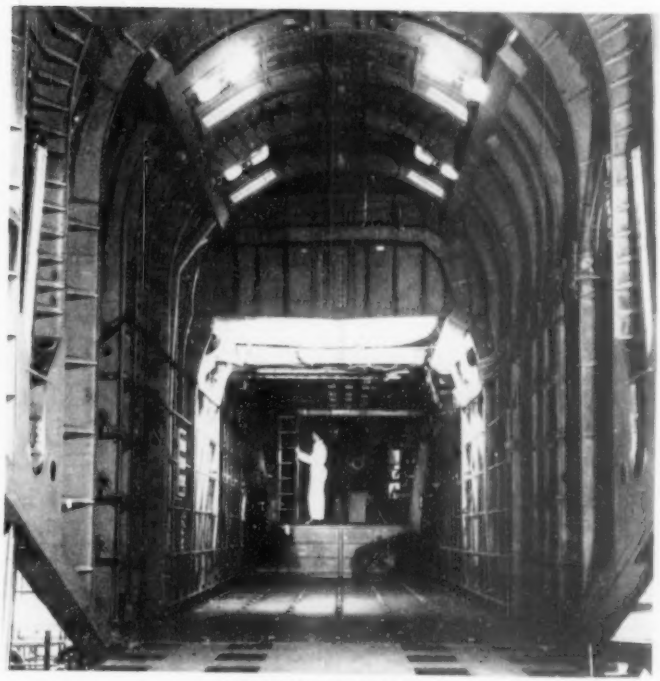
It was understood that Bunker and his assistant, J. B. Wharton, vice-president and treasurer of Trailmobile, would make a preliminary survey of the Martin organization at Baltimore next week.

Position of C. C. Pearson, now Martin president, is still not definite in the new set-up. It is understood that he will probably be invited to remain as head of production, if he wishes to do so. There are reports, however, that he will go to another aircraft company, possibly returning to Douglas where he made an outstanding record for production in World War II.

►**Financing**—New management for Martin, such as would be provided by Bunker and Wharton, was reportedly one of the prerequisites for the recent refinancing program, which will put approximately $32 million in aggregate financing into the company.

Their nomination confirms earlier forecasts (AVIATION WEEK Jan. 14, p. 18) that "the new top men might be picked from an allied industry such as a transportation equipment manufacturer."

The Mellon interests handle a large portion of the V-loans which are a part of the new financing. It is planned to increase V-loans from $16.5 million to $27.5 million. The Mellon interests' acquaintance with Bunker's ability stems from the Mellon banking activities in connection with Pullman.



LOFTY INTERIOR

Roomy freight compartment of the British Blackburn & General Universal Freighter is emphasized in this view. The compartment has a level floor 36 ft. long, 10 ft. wide and has a headroom of 10 ft. Floor panels and supporting structure can take distributed loading of 325 lb. sq. ft., and can handle vehicles weighing 9,000 lb. The lug four-engined GAL 60 has undergone extensive testing by the RAF.

CAA Reorganizes Its Safety Set-up

The Civil Aeronautics Administration has completed its long-scheduled reshuffle of aviation safety officials and offices, except at the top. Safety Director Ernest S. Hendley and Deputy Director W. B. Davis remain untouched.

Regional safety czars take over responsibility for air safety in the regions, working somewhat independently of the regional administrators.

And two newly created Washington offices are set up: one is the new Air Carrier Safety division with former Flight Operations Chief E. B. Franklin as chief; the other is General Safety, with former Personal Aircraft Branch head E. W. Hudlow as chief. Abolished as separate divisions are the Airman division (former chief W. S. Moore is transferred to the Ft. Worth Region), and Flight Operations division.

Chief object of the reorganization, it was claimed, is to pin down responsibility for airline operations safety.

Senate Confirms Air Force Changes

Three appointments confirmed by the Senate involved new and former Air Force officials.

The appointments:

• **Eugene M. Zuckert**, former Assistant Secretary of the Air Force, to be a member of the five-man Atomic Energy Commission, a key post in the defense program which now centers around atomic weapons. At USAF, Zuckert supervised contract financing.

• **E. V. Huggins**, former executive vice-president of Westinghouse Electric International Co. to be Assistant Secretary of the Air Force. He is to have responsibility for policies relative to installations and material procurement.

• **Edward Dickinson**, former Defense Department civilian official, to be vice-chairman of the National Security Resources Board. He served as deputy for installations in the Office of Secretary of the Air Force, and as assistant to the Joint Secretaries of Defense Department.

Marine Jets

- **Corps looking for faster close-support planes.**
- **And they want jet with an interchangeable nose.**

By A. W. Jessup
(McGraw-Hill World News)

1st Marine Division, Korea—The U. S. Marines are becoming jet-minded. Within the shortest possible time, i.e. no longer than it will take to get jet aircraft meeting Marine requirements, Marine air support will be all jet.

"Close air support in the future has to be jet-delivered," Maj. Gen. Gerald C. Thomas, former commander of the 1st Marine division told AVIATION WEEK prior to his departure for assignment as assistant commandant of the Marine Corps. "We are modern, and we must stay that way. The AD Skyraider and the A2D Skyshark are excellent aircraft, but no one can guarantee that three years from now we can do our job with them. A jet is the only plane we can safely plan on."

▶ **Changeable Nose**—The Marines say they can afford to support and maintain only one model of aircraft. So they are looking for a multi-purpose jet with detachable and interchangeable nose sections. One nose section would carry guns, another radar equipment and another aerial cameras. The choice of nose sections, plus the variable external loads of fuel in wing or tip tanks and/or of bombs, napalm and rockets on one good basic airframe, would give them an airplane capable of handling every Marine air requirement.

Of extreme importance to the Marines is airborne radar. They want equipment which, when mounted in an airborne controller's aircraft and teamed up with ground radar, will enable the delivery of "close-support strikes during periods of no visibility." Experiments with old equipment, while not very successful, indicate that the problem is solvable.

Jets force some sacrifices in what has been considered Marine close-support dogma. One is in armament load. Another is in endurance to stay on station over the target area. On the latter point, General Thomas says, "We don't want that anyway. It is wasteful of aircraft."

▶ **Ack-Ack Problem**—He sees future close support provided by jets working from fields which are very close to the front. Pilots are thoroughly briefed on targets while on the ground and are quickly directed to the close-support target by the airborne controller, expend their ammunition quickly and return to base to ready for the next mission. It is believed that this system will provide greater efficiency in utilization of aircraft. Furthermore, it is considered probable that enemy anti-aircraft and jet fighter sweeps would rack up a big if not prohibitive score of fighter-bombers orbiting on station along the front line.

This theory of itself changes the loading requirements for close-support aircraft. Previously, it was desirable that those aircraft waiting on station to be called in for close-support strikes carry a wide assortment of ammunition: rockets, two sizes or types of bombs, cannon or machine guns, and/or napalm.

Now, less varied, and consequently less wasteful, armament loadings will be required. Most aircraft will be armed for specific targets. When pilots head for home there won't be unused armament to be dumped before landing. (While, in theory, anything dumped on enemy territory might be considered in some way effective, a study of the records would reveal a large net waste from the armament which has had to be jettisoned on the way home.)

Marine flyers who have flown F9F Panther jets, F4U Corsairs and ADs in close-support say that the jet is an excellent firing platform. Some say it's the best. So there isn't as much concern on this subject as was argued a year ago.

▶ **ADs Outclassed**—In line with this change in Marine thinking, it's almost certain the Marine Corps has informed the Navy that it probably has few future requirements for ADs or for A2Ds.

Reluctantly and privately, high-ranking Navy officers express embarrassment at how far behind the Navy has slipped in development of aircraft for the jet age. Until the MiG-15 began showing

ARMY TAKES DELIVERY ON ITS FIRST BEECH TWIN-BONANZA

First flight view of six-place Beech Twin-Bonanza purchased by Army Field Forces shows its military markings. It carries designation YL-23, will be used as a "flying staff car" by general and staff officers of army and corp headquarters. The YL-23 is powered by two Lycoming GO-435-22 engines, has a cruising speed of 190 mph. at 10,000 ft., 1,500 fpm. rate of climb, 19,000 ft. service ceiling and a range of 1,155 mi. First four planes were purchased out of fiscal 1952 funds. Purchase of additional quantities from fiscal 1953 funds was canceled when Army was cut from requested $241-million budget to $36 million. But Army is now negotiating for an additional 55 L-23s, presumably to be purchased out of 1954 funds.

its stuff in North Korea, the Navy smugly pointed to the AD as the best close-support aircraft in Korea, which it was.

Now, they admit the AD is getting its last workout. Along with the Corsair, it will be limited after Korea to training and patrol missions. More important, the Navy isn't likely to get a jet fighter which, plane for plane, can stay in the sky with the MiG in less than two years, nor a jet support airplane for its own and Marine use any quicker for that matter.

SEC Reports Stock Transactions

Purchase of 400 capital shares of Airfleets, Inc. stock by Floyd B. Odlum, officer, making a total holding of 8,600 shares, is reported in the latest Securities and Exchange Commission survey.

Other transactions reported recently by aviation officials are:

● **Air Associates, Inc.**—Gilbert Colgate, director and beneficial owner, sale of 800 common shares, leaving a total holding of 14,448 shares; Myron B. Gordon, director, purchase of 100 common shares, making a total holding of 500 shares, and purchase of 100 preferred shares, making a total holding of 500 shares; C. M. Leeds, officer, purchase of 100 common shares, total holding, and purchase of 100 preferred shares, making a total holding of 500 shares; Raymond H. Snyder, director, sale of 2,500 common shares, leaving a total holding of 100 shares, sale of 800 preferred shares, leaving a total holding of 1,800 shares.

● **Avco Manufacturing Corp.**—James Bruce, director, purchase of 800 common shares, making a total holding of 1,000 shares; Irving B. Babcock, director, sale of 27,500 options for purchase of common stock, leaving a total of 68,720.

● **Bell Aircraft Corp.**—Ray P. Whitman, director, purchase of 500 common shares, total holding.

● **Capital Airlines**—Hayes Dever, director, sale of 300 common shares, leaving a total holding of 100 shares; Raymond G. Lochiel, director, purchase of 100 common shares, making a total holding of 2,515 shares.

● **Chicago and Southern Airlines**—William T. Arthur, officer, sale of 400 common shares, leaving a total holding of 100 shares.

● **Colonial Airlines**—Joseph Shields, director and beneficial owner, purchase of 2,000 common shares, total holding.

● **Consolidated Vultee Aircraft Corp.**—LaMotte T. Cohu, director, sale of 200 common shares, leaving a total holding of 7,266 shares.

● **Curtiss-Wright Corp.**—Paul V. Shields, director, sale of 3,500 common shares, leaving a total holding of 500 shares; Paul V. Shields, for holding company, sale of 500 common shares, total holding.

● **Eastern Air Lines**—S. Peabody, Jr., director, purchase of 100 common shares, and sale of 100 common shares, leaving a total holding of 1,200 shares; S. Peabody, Jr., for trusts, purchase of 20 common shares, making a total of 160 shares.

● **Fairchild Camera and Instrument Corp.**—Clark H. Minor, director, sale of 314 common shares, leaving a total holding of 2,620 shares; Clark H. Minor, for corporation account, sale of 500 common shares, total holding.

● **Grumman Aircraft Engineering**—Albert P. Loening, director, sale of 700 capital shares, leaving 29,000 shares.

● **Lockheed Aircraft Corp.**—Hall L. Hibbard, director, sale of 2,000 capital shares, leaving a total holding of 2,000 shares; L. W. Wulfekuhler, officer, sale of 200 capital shares, leaving a total holding of 1,400 shares.

● **Glenn L. Martin Co.**—William L. Ruttig, officer, sale of 100 common shares, leaving a total holding of 300 shares; Jess W. Sweetser, officer, sale of 100 common shares, total holding.

● **National Airlines**—Jerome M. Rosenthal, officer, purchase of 400 common shares, making a total holding of 500 shares; Robert E. Wieland, officer, purchase of 200 shares, making a total holding of 300 shares.

● **Northrop Aircraft**—Richard W. Millar, director, sale of 100 common shares, total holding.

● **Piper Aircraft Corp.**—W. T. Piper, director, sale of 500 common shares, leaving a total holding of 140,656 shares.

● **Ryan Aeronautical Co.**—Colin A. Stillwagen, officer, sale of 400 common shares, leaving a total holding of 200 shares; Colin A. Stillwagen, for wife, purchase of 100 common shares, total holding.

● **United Air Lines**—Curtis Barkes, officer, sale of 200 common shares, leaving a total holding of 451 shares.

● **United Aircraft Corp.**—H. Mansfield Horner, director, sale of 300 common shares, leaving a total holding of 1300 shares.

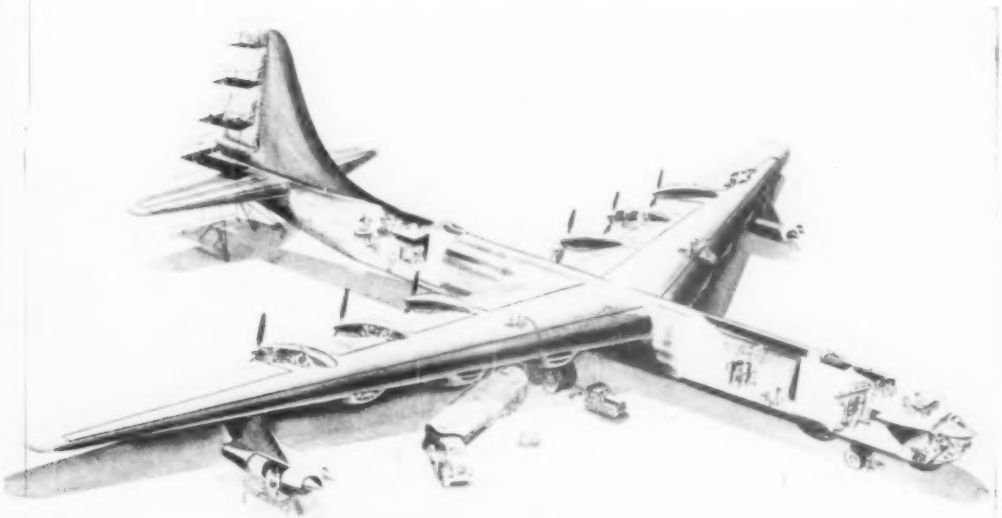
● **United Aircraft Products**—John M. Meyers, officer, for Metal Production Corp., purchase of 700 common shares, making a total holding of 50,700 shares.

Registration Asked

Everyone who takes up business matters with government officials would have to register and disclose his income under legislation Sen. Estes Kefauver plans to push.

This would include airlines and other representatives who discuss business with CAB and CAA officials, as well as defense contractors dealing with the military.

Defense Needs More Scrap



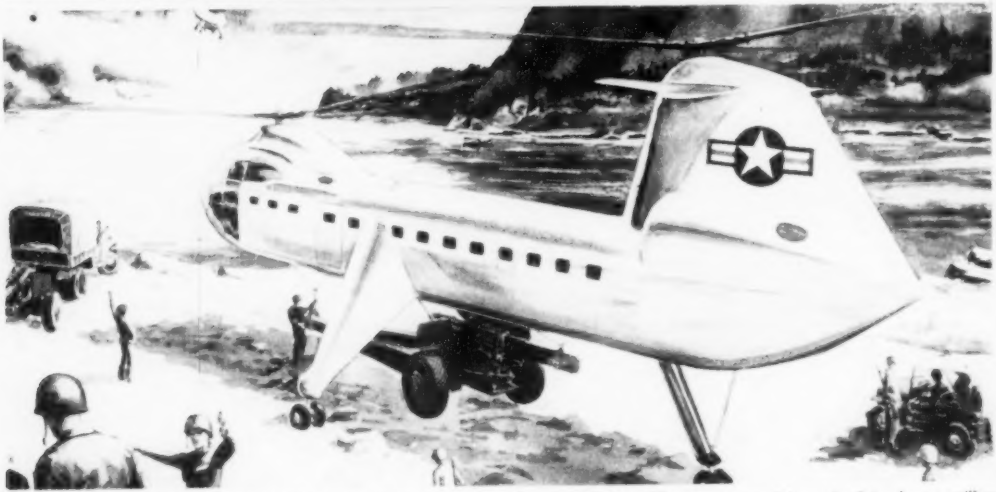
B-36 POSES BIG MAINTENANCE PROBLEMS

Graphic view of some of the work and skills required to take care of the USAF's mammoth Convair B-36D intercontinental bomber is given in this sketch of the plane undergoing servicing. For flying, the B-36 takes a highly skilled 15-man crew; for ground maintenance it needs over 50 distinct types of specialists. Training command transitions flight personnel through various SAC units. During the last fiscal year, the command graduated approximately 37,000 technicians of various kinds through 37 courses to work on the B-36D. The plane's complex armament, electronics and instruments systems alone call for extremely high-grade, very specialized training to produce personnel capable of keeping them in tip-top condition.

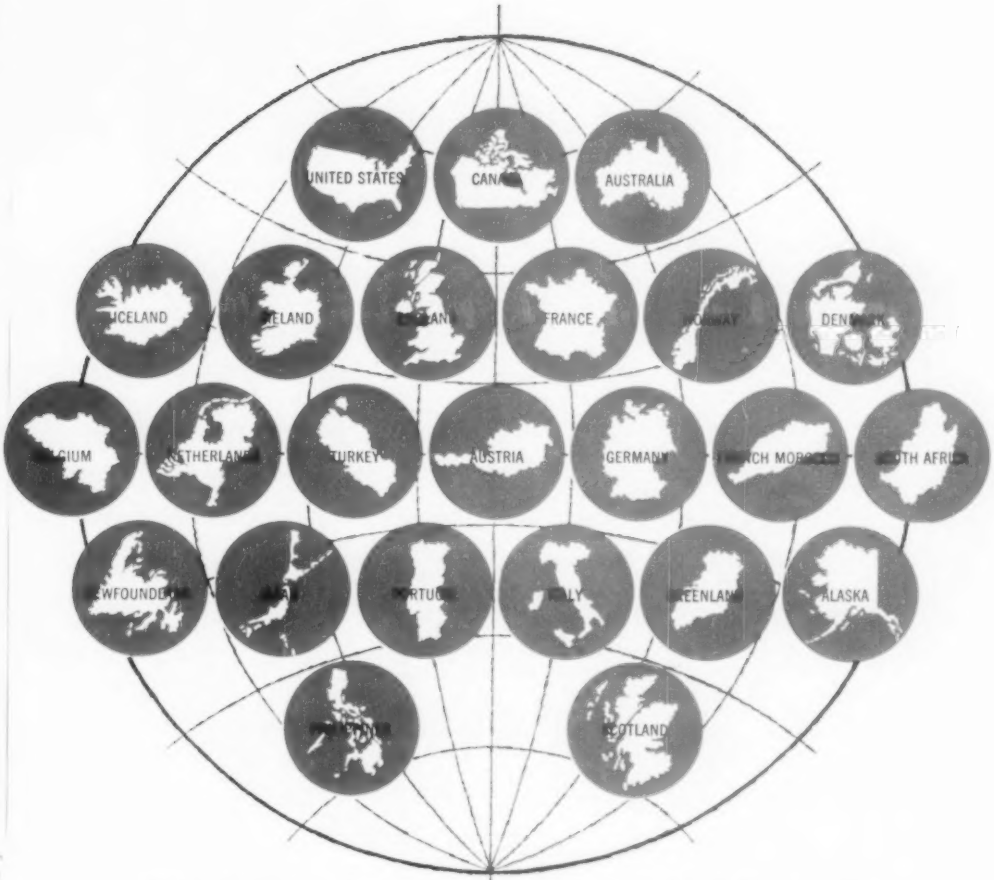
BRISTOL 173'S FIRST HOP—New twin-engine Bristol 173 ten-passenger twin-rotor copter (above) is seen during its first flight test recently. Powered by two 550-hp. Alvis Leonides LE. 25 HMVs, the 173 has a normal gross weight of 10,600 lb., 142 mph. top speed.

Copter Developments

BRISTOL 171—Head-on view (left) of Bristol Sycamore evacuation copter points up large expanse of transparent areas around cabin. Perspex blisters behind cockpit are detachable, enclose stretchers. Sycamore can carry up to four, including two casualties.



PIASECKI XH-16 WORK-HORSE—Artist's view indicates how new Piasecki XH-16 could support ground forces by flying heavy artillery over river and mountain barriers blocking normal ground vehicles. First XH-16 is nearing completion at company's Morton, Pa., plant.



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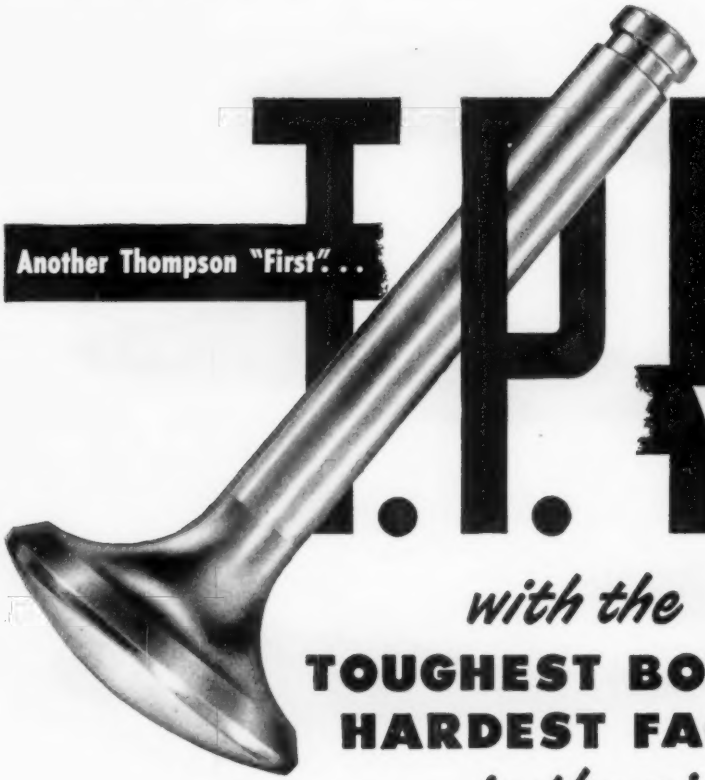

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"Hundreds more service-hours" . . . "longer time between valve replacement" . . . "no signs of burning" . . .

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Market Action of Airline Stocks

COMPANY	1945-6 HIGH	12/31/49 CLOSE	12/31/50 CLOSE	12/31/51 CLOSE	% CHANGE, 1951 OVER 1950 CLOSE
American	19	9⅝	15⅛	16½	22.7%
Braniff	37	8	12⅞	14⅝	13.9
Capital	49	8¼	13¼	15⅛	13.9
C. & S.	36	7	9⅝	13	31.7
Colonial	45	4⅛	7⅛	11⅛	56.7
Eastern	33	14⅛	19⅛	28¼	45.5
National	41	7⅛	13¼	16⅛	25.5
Northeast	25	2⅛	5¼	5½	7.3
Northwest	63	11⅛	13⅞	15⅞	14.5
Pan American	29	9¼	11⅞	11⅞	−1.1
TWA	79	17	23⅞	24⅝	1.6
United	62	13⅜	23	33⅝	46.2
Western	40	8	12⅞	15⅛	18.6

NOTE: *All fractions eliminated from 1945-46 prices.*

Carrier Report: Steady and Rising

Airline stocks closed '51 on solid note, with equities gaining on basis of solid growth and profit prospects.

The year 1951 was good to airline investors. Equities of all domestic carriers finished the year at varying higher prices than prevailed at the start of 1951.

Despite all-time peak earnings, however, not a single airline equity surpassed the high market tops established during the 1945-46 boom in air carrier securities.

This can be seen from the accompanying table which shows year-end closing prices for the last three years as well as the peak levels recorded in 1945 or 1946. Without exception the market gains at the 1951 year-end for the separate airline equities have been especially impressive when compared with Dec. 31, 1949 closing prices.

▶**Best Show**—The best showings for 1951, for normal reasons, belong to United and Eastern, with gains of 46.2% and 45.5% respectively in market appreciation for the year. The 56.7% rise in Colonial may be attributed to the speculative interest developed as a result of its proposed acquisition by National.

▶**Paradox**—While 1951 earnings, in a number of instances, have hit all-time peaks, airline equity quotations in most cases are currently materially below the top market prices established in 1945 and 1946.

For example, United Air Lines sold at 62¼ in 1945. For that year it earned $2.35 a common share. In 1944 its earnings amounted to $3.79 per common share. For 1951 United is estimated to have earned at least $3.90 per common share, yet this equity commands a market quotation around 33.

Similarly, Western sold at 40¼ in 1945 and earned 21 cents a share that year. In 1951 earnings were estimated at $2.50 per share but the current market is around 15.

In a large measure the more conservative market evaluation of present and future earning power is an indication of more stability being developed by the industry. In the postwar period rampant speculation hit airline equities. Tremendous growth possibilities were being read into market quotations. In effect, the future potentialities of the industry were being discounted in liberal measure.

Instead of the great growth in traffic and earnings, came a severe deflation in prospects and the rapidly mounting deficits of 1946, 1947, and 1948. This was almost immediately reflected in the sharp deflation of market quotations which hit their low points in 1948 and remained slightly groggy during 1949.

▶**The Turn**—As traffic began to take hold in real measure with new equipment and tighter cost control beginning to exert their beneficial effects, the industry started to develop some real earning power. This gained rapid momentum starting in 1949, with a net income for the domestic trunklines estimated at $20 million, increasing to $36.5 million for 1950, and $48 million projected for last year.

All this has found immediate reflection in the market quotations of airline shares in recent years. The improvement for 1951 airline common stock quotations range from 1.6% for TWA to 46.2% for United. (Colonial's 56.7% gain, as mentioned above, is due to a special condition not related to any earnings improvement.) Only Pan American shows a slight decline for the year, 1.1%.

Following the top gains recorded by United and Eastern, Chicago & Southern was next with 31.7%, closely followed by National with 25.5%.

It is interesting to observe that the percentage improvement at the 1951 year-end compared with 1949 closing prices are enough to revive the hearts of the coldest investors.

For example, the equities of Capital, Chicago & Southern, Colonial, Eastern, National, Northeast, United, and Western either almost doubled or exceeded this gain during the two-year period under study. In fact, United's common increased more than 147% between these two measuring dates.

▶**Speculators Sad**—While many speculators are disappointed that 1951 market quotations hardly matched the same times-earnings prices that prevailed in the heady airline market days of 1945-46, the industry will remain much healthier as a result of the absence of speculative excesses.

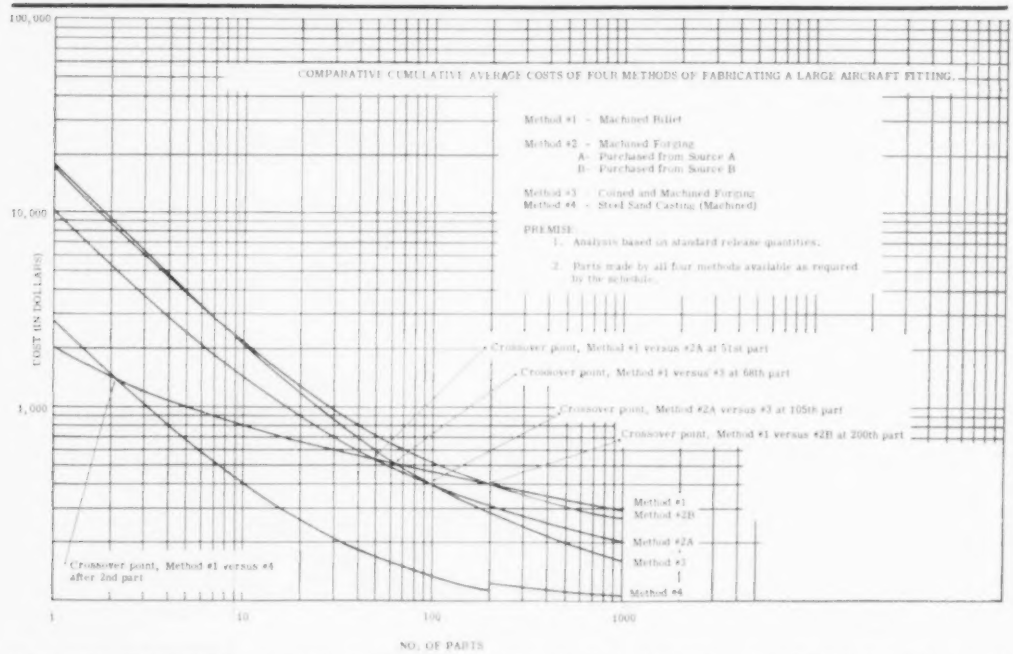
Rampant speculation is rough medicine for an industry that requires a steady flow of capital from an investment market.

Many speculators and investors alike, hurt in the airline inflation of 1945 and 1946 and the subsequent deflation, remembered their experiences only too well and compounded the difficulties of the industry desperately seeking much needed new capital later.

The decline from the 1945-46 peaks to the 1948 and 1949 low points was by no means uniform. Moreover, the subsequent market recoveries that took place during 1950 followed an entirely different course for the individual carriers than prevailed in the past. Variations of another pattern were equally pronounced in 1951.

This is the best assurance that 1952 year-end closing market prices will have an entirely different set of surprises all of their own for the individual airline equities.

—Selig Altschul


COMPARATIVE CUMULATIVE AVERAGE COSTS OF FOUR METHODS OF FABRICATING A LARGE AIRCRAFT FITTING.
Method #1 – Machined Billet
Method #2 – Machined Forging
A– Purchased from Source A
B– Purchased from Source B
Method #3 – Coined and Machined Forging
Method #4 – Steel Sand Casting (Machined)
PREMISE:
1. Analysis based on standard release quantities.
2. Parts made by all four methods available as required by the schedule.
Crossover point, Method #1 versus #2A at 51st part
Crossover point, Method #1 versus #3 at 68th part
Crossover point, Method #2A versus #3 at 105th part
Crossover point, Method #1 versus #2B at 200th part
Crossover point, Method #1 versus #4 after 2nd part
Method #1
Method #2B
Method #2A
Method #3
Method #4
100,000
10,000
1,000
COST (IN DOLLARS)
1
10
100
1000
NO. OF PARTS

UNIT COST COMPARISON, prepared by Northrop engineers, for four methods of fabricating a large fitting, indicates advantage of forging for quantity output.

Forging Advances Point Way to Savings

- **More than half the weight of its rough forgings is now machined off in finishing, Northrop finds.**
- **So improved techniques, plus the use of larger presses, should make possible considerable cost-cutting.**

Improved forging techniques and larger press capacities point the way to substantial cost-cutting in the overall airframe scheme–from design down on through production.

Northrop Aircraft, Inc. has its eye on the future possibilities of the forging press and has drawn upon its experience with the F-89 Scorpion to indicate the potential savings through forging advances.

▶**Plenty to Chips**–At present there are 141 individual light alloy forging designs incorporated in the F-89. Counting duplicate forgings of the same design, there are 342 light alloy forgings on each airplane of the model currently in production.

Total weight of the rough forgings is 1,523 lb. In sharp contrast, the total weight of the finished forgings is only 760 lb.

Considering this in terms of the individual unit, the average weight of the 342 rough forgings is 4.4 lb., whereas the average weight of the finished forgings is only 2.2 lb. This means that approximately 50% of the material in these rough forgings is being reduced to chips during machining.

▶**Operations Required**–The light alloy forgings on the F-89 vary from quite small to moderate in size. The largest forging weighs 37 lb. rough and only 15.5 lb. finished. This piece requires 45 machine operations and 20.5 hr. in machine time. The smallest forging weighs 0.18 lb. rough and 0.10 lb. finished. It requires 7 machine operations and 0.8 hr. in machine time.

The large forging is 41 in. long and the small forging is 5 in. long (in the rough).

It is of general interest to note that, of the 342 forgings, 133 are 75S aluminum alloy, 201 are 14S material, and eight are magnesium alloys. It is recognized, says Northrop, that forging presses are particularly essential, as compared with hammers, insofar as the forging of 75S and magnesium alloys are concerned.

▶**Savings Estimated**–Analyzing what this machining means in terms of production time, it is found that the average number of machine operations required per forging is approximately 12. The average machine time per forging is 4.4 hr. And the total machine time for light alloy forgings per plane amounts to 1,509 manhours.

Possible savings in machine time through improved design and forging practices are, therefore, a most significant goal of the aircraft industry, Northrop holds. It is expected that larger press capacity will make possible

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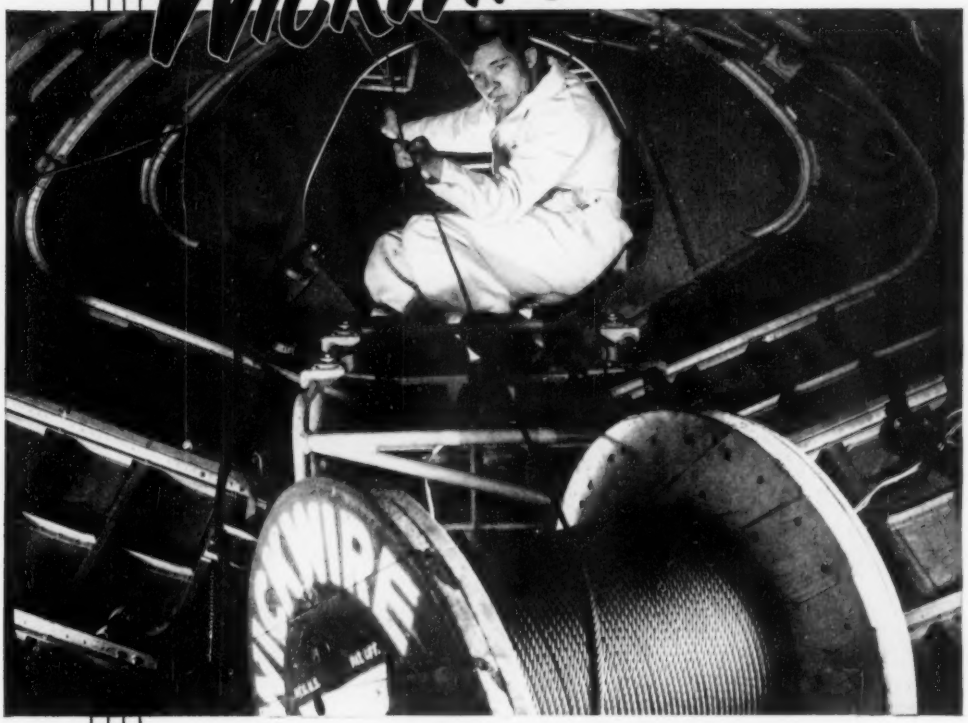

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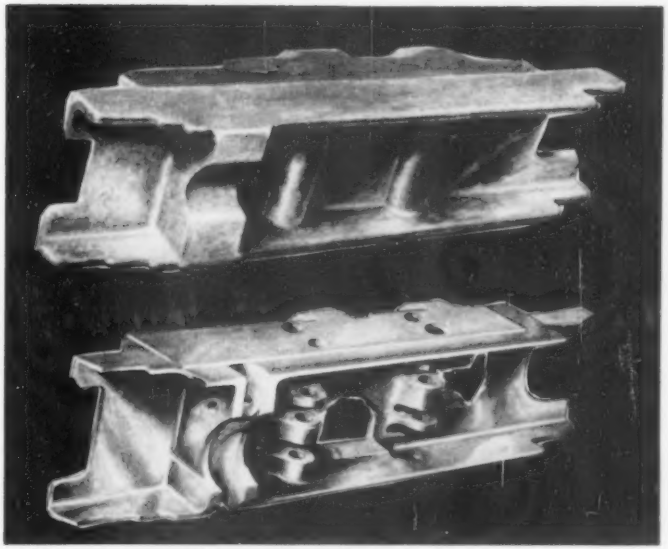
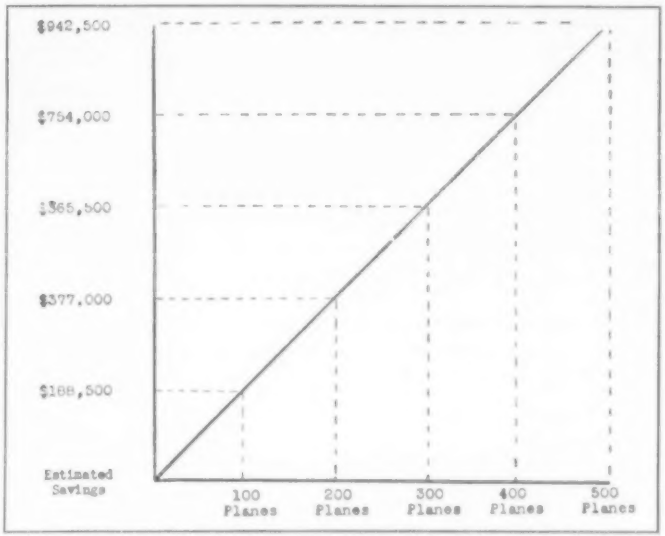
Light Alloy Forgings In F-89 Production

Number of light alloy forging designs on F-89: 141
Total number of light alloy forgings on F-89: 342
Total weight of rough forgings: 1,523 lb.
Total weight of finished forgings: 760 lb.
Average weight of rough forgings: ..... 4.4 lb.
Average weight of finished forging: ..... 2.2 lb.
Average machine operations per forging: 12
Total machine time per plane: 1,509 hr.
Average machine time per forging: ..... 4.4 hr.

A savings of only 25% in machine time through improved forging practices would mean a saving of 377 manhours per plane.
At $5 per manhour, the savings would amount to $1,885 per plane.
Production of 500 planes would justify expenditure of $942,500 on improved tooling for forging manufacture.



BETTER technique could cut cost of making finished part from rough forging (top).



SAVING would be high if technique were improved to eliminate 25% machining.

the production of forgings incorporating higher dimensional fidelity. Reduction of draft angle requirements and web thicknesses should also stem from the use of such equipment, Northrop reports.

An estimate of the manhour and dollar savings which could be achieved through a saving of only 25% in machine time is shown in an accompanying chart. If the total machine time per plane is 1,509 manhours, a 25% saving in machine time would mean a saving of 377 manhours per plane. At $5 per manhour the saving would amount to $1,885 per plane. For 500 planes this would total $942,500—nearly $1 million.

► **Methods Compared**—This gives some indication of the tremendous potential economics which may be achieved through anticipated advances in forging techniques. It should again be stressed that the possible dollar savings indicated in the chart are based on potential savings of only 25% in machine time through the use of improved forgings. In actual practice it is possible that the saving in machine time might prove to be substantially greater than 25%, Northrop believes.

For the comparative economics of large aircraft fitting designs, another accompanying chart presents the cumulative average costs of four methods of fabrication. This analysis is based on the all-important assumption that all parts will be available as required by the production schedule.

This unrealistic premise, Northrop says, can eventually become actuality through the proposed increase in forging facilities.

The fabrication methods compared are:

- **Machined billet.**
- **Machined forging** (purchased from two sources, A and B).
- **Forged-to-size part.**
- **Steel sand casting (machined).**

► **Comparisons**—The chart indicates that the conventional forging from the cheaper vendor is less expensive than the billet machined part starting with the 51st part.

It shows that the forged-to-size design is more economical than the machined billet at the 68th part and that it becomes cheaper than the conventional forging at the 105th part.

It is apparent that the steel sand casting is the least expensive after fabrication of the second part; how-

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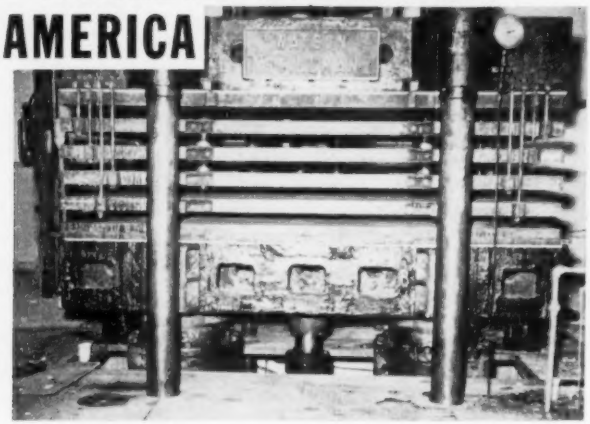

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West Coast Representative	ALLIED PRODUCTS ENGINEERING CO.	*Los Angeles 43, California*

ever, weight and structural requirements and the difficulty of procuring aircraft quality castings are usually controlling in the choice of this method.

The diagram points to the great potentiality of the forged-to-size design.

Although lack of sufficient press capacity is the primary reason for forging difficulties, Northrop Aircraft believes that there are also other problems tending to cause excessive machining of forgings. Among these are the use of badly worn presses, insufficient number of operations in producing each forging, inadequate die design, high cost starter dies, and die wear.

NACA Money

- **Research demands rise, cash lags, Hunsaker says.**
- **Fundamental research pays off in future design.**

Government budgeteers trying to buy rearmament fast by channeling huge sums to the military are overlooking an important point, in the opinion of Dr. Jerome C. Hunsaker, chairman of the National Advisory Committee for Aeronautics. They are not giving NACA enough money to enable it to keep pace with the services' research demands.

"The military research and development program has been increased threefold," Hunsaker says in his letter transmitting NACA's annual report to Congress, "but to date the funds and manpower authorized for NACA have not expanded to support adequately the military effort."

▶ **Enemy Is Smart, Too**—The military research and development program has grown to keep step with increased procurement of new types of aircraft. But each new type brings a host of associated problems which are turned over to NACA. And NACA hasn't the funds and resources to do all this work and still dig deeply into fundamental research.

"Only by concentration on fundamentals may we expect to find leads to radically new developments which should pay off in design of future aircraft," Hunsaker warns. "We do not know how long the present period of tension will last nor do we know what discoveries an enemy may make."

He is not optimistic that the fruits of research can be preserved solely for U. S. benefit. The repeated attainment of supersonic, Hunsaker says, has made possible radical gains in airplane performance that are of great military importance. He adds: "Such gains are

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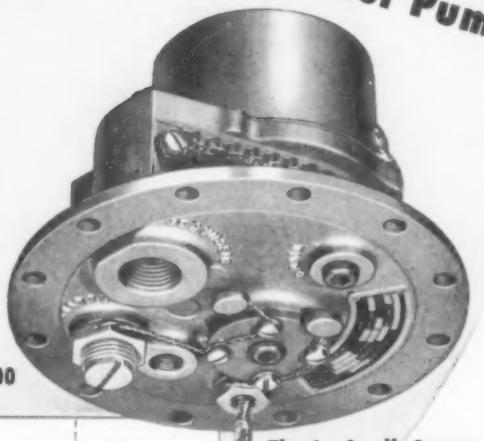

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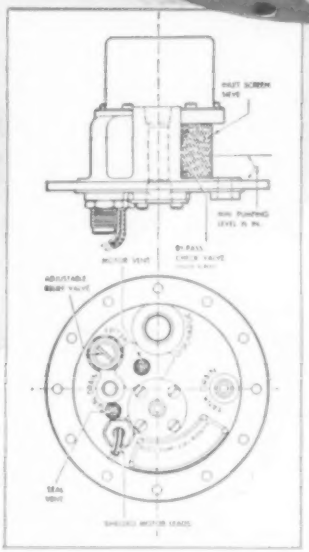

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OUTPUT: 40 g.p.h. min.
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WEIGHT: 2 lbs., 7 oz.
SIMPLE CONSTRUCTION.
Integral relief valve is adjustable between 3 & 12 p.s.i. and it limits shut-off pressure to a max. of 2 p.s.i. above pressure at rated flow.

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also attainable by a potential enemy."

► **Past in Review**—The report which accompanies Hunsaker's letter covers the fiscal year that ended last June 30. Due to the fact that so much of NACA's work is restricted for security reasons, the report contains practically no previously unreleased information, but summarizes the technical notes issued throughout the year.

Some points made in the year-end report which are worth reviewing:

• **Thick wing root sections** necessary on high aspect ratio wing need not have high profile-drag coefficients. Maximum attainable lift-drag ratio may be increased appreciably with boundary layer control. (Tech. Note 2405)

• **Base-drag reduction in missiles** may be obtained by moving the tail so that the trailing edge is about one chord-length ahead of or behind the base of the missile body. (Tech. Note 2360)

• **End plates on swept wings** at low lift coefficients may increase the slope of the lift curve, reduce maximum lift-drag ratio, decrease maximum lift coefficient and increase longitudinal stability. (Tech. Note 2229)

• **The airfoil section,** which is generally one of the two controlling factors in airplane performance, had no apparent effect on the flying qualities of a model representative of a proposed future military aircraft in which mass is concentrated along the fuselage. (Tech. Note 2219)

• **Greater helicopter speed** is expected to require higher tip speeds of the rotors in order to avoid loss of lift and consequent tip stalling of the retreating blades. But the higher tip speeds cause some performance loss due to compressibility. Compressibility effects can be delayed by linear twist. (Tech. Note 2277)

Order Cancels Fisher Lathe Production

The muddled U. S. machine tool program for aircraft has been given a fresh automotive industry twist, with notice to Fisher Body division of General Motors of cancelation of its previously awarded order to make Bullard Multimatic lathes.

Sen. Blair Moody, champion of the Detroit area as a place where additional contracts should be placed to meet the rising labor surplus in slowed-down auto plants, fired a broadside into National Production Administration about the cancelation.

Air Force sources told AVIATION WEEK that the total Bullard requirement for contractors of all services was approximately 750 machines and that the USAF share of this was slightly less than 400 when the requirements were assembled last October.

The arrangements that were made for Fisher to participate with Bullard were approved under an order by General Services Administration, acting for NPA, DPA and Department of Defense.

Sen. Moody said he understood the Fisher plant was "within 13 tools" of being ready to start production when the cancelation was received.

Indications are that the Bullard cancelation was a result of the lowering of Air Force peak aircraft production requirements under the new pushed-back schedules for production.

Another factor was reported to be the fact that a number of aircraft engine manufacturers who had figured to use Bullard machines, had decided to "make do" with other machine tools, less ideally suited for their work, but more immediately available.

Air Force sources told AVIATION

'MINIATURE' THAT PRE-PROVED XP5Y-1

This 1/10-scale, radio-controlled, dynamically similar model served as the development cornerstone in the creation of Convair's huge Navy XP5Y-1, world's first turboprop flying boat. Craft, reported to be the first full-scale aircraft to be developed from a dynamic model, had its characteristics evaluated with this midget, tested and modified over a period of years. Model was displayed at Miami Air Races, but later damaged in shipment. On repair it goes to Smithsonian's National Air Museum.

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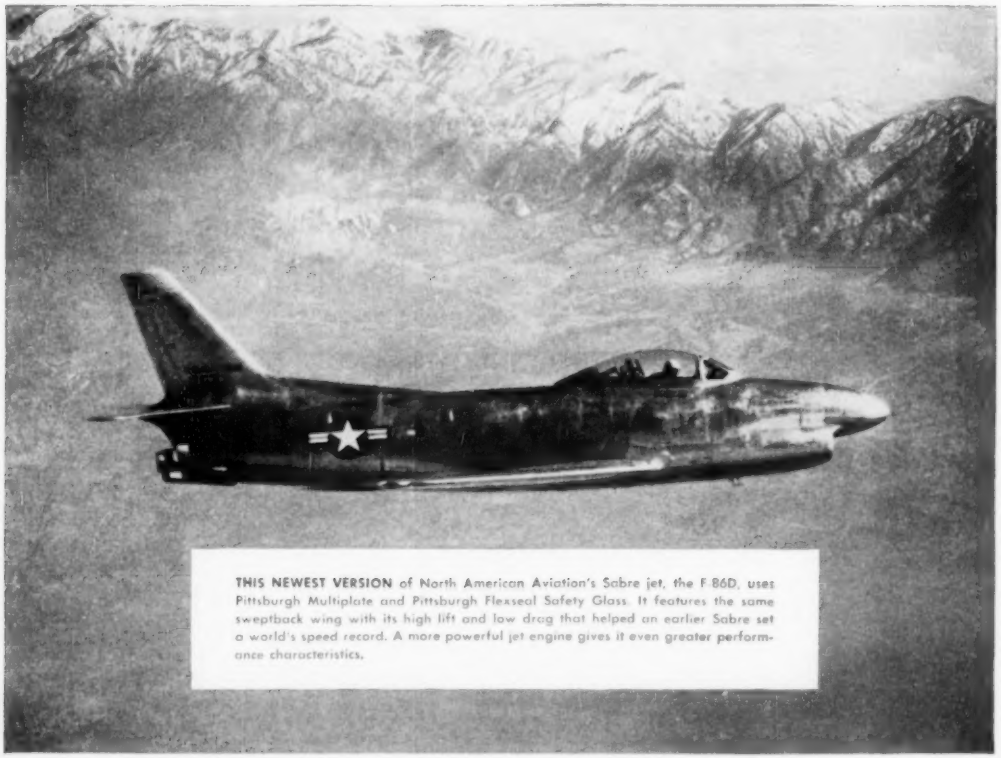
Bent *FLEXSEAL* Safety Glass solves difficult optical problem on North American's newest Sabre jet



THIS NEWEST VERSION of North American Aviation's Sabre jet, the F-86D, uses Pittsburgh Multiplate and Pittsburgh Flexseal Safety Glass. It features the same sweptback wing with its high lift and low drag that helped an earlier Sabre set a world's speed record. A more powerful jet engine gives it even greater performance characteristics.

NORTH AMERICAN AVIATION'S new F-86D Sabre jet features even greater speeds and higher altitudes than its Sabre predecessors. These performance improvements presented a difficult optical problem that Pittsburgh engineers helped to solve.

To give the pilot the greatest possible freedom from vision distortion, Pittsburgh engineers designed special bent panels of Pittsburgh Flexseal Safety Glass for the openings to the right and left of the windshield. This glass-and-plastic lamination has the stamina to stand up under the speeds and altitudes at which this plane operates.

The windshield of the Sabre makes use of Pittsburgh Multiplate Safety Glass, a bullet-resisting, gunsight reflector-type glass.

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WEEK that Fisher would shortly get another assignment for machine tools manufacturing to take the place of the Bullard cancelation. Fisher is to be reimbursed for money invested in tooling for the Bullard project, under a GSA guarantee.

The Bullard cancelation came paradoxically, on the heels of a blast in Congress by Sen. Burnet Maybank's Joint Committee on Defense Production on the general machine tool situation. It cited machine tools production as the No. 1 bottleneck in the defense picture and criticized Department of Defense for not acting sooner to substantially increase machine tool production and cut down the backlog.

First Delivery Made By Small Contractor

The M. H. Pryor Manufacturing Co. of Mansfield, O., has delivered its first B-47 wheel to prime B-47 wheel and brake contractor B. F. Goodrich. This is one of the more successful small business Air Force subcontractor stories, since Pryor is making B-47 wheels entirely with used machine tools drawn from the Air Force tool reserves at Marietta, Ga., and Omaha. Company started only six months ago —July 6, 1951.

Previously, Pryor was an inactive company owning a shut-down warehouse in Mansfield. Pryor has 40 employes. He organized the company in 1942 and made castings in World War II, but shut down and sold out after the war. Goodrich helped start him up again last summer.

One of his USAF reserve milling machines (a "Cincinnati") is of 1917 vintage.

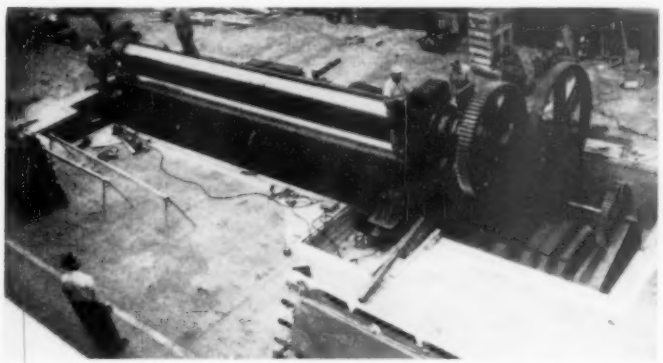
Goodrich and Air Force officials attended ceremonies on Pryor's delivery of the first B-47 wheel to Goodrich.

Ebco Sees Big Transport Backlogs

Canadair Ltd., Montreal, is looking forward to making profitable use of its licenses to manufacture the Douglas DC-6, DC-6A and DC-6B for Canada and the British Isles after the present emergency. This is indicated by its parent company, Electric Boat Co., in its annual report.

Ebco notes the steadily rising Canadian air traffic—from 364,000 passengers carried in 1945 to 1,233,000 in 1950—and says that in light of civil aviation production "being shelved" for the time being, there will be a sizable backlog built up for transports. Ebco apparently intends to benefit from this situation at the proper time.

Canadair built 71 Douglas North Stars and Canadair Fours (DC-4/DC-6 with Rolls-Royce Merlins). Presently the company is building, or will build, under license, North American F-86 Sabres, Beech T-36A advanced trainer-transports and Lockheed T-33 trainers.



A B-36 WING SKIN IN 28 SECONDS

Convair has installed a new pinch-type bending roller in the Ft. Worth plant which will shape a B-36 wing skin in 28 seconds. Acquisition of the roller will make it unnecessary for Convair to ship the wing skins to Houston, where a similar tool was used for processing. Eliminated, too, will be the danger of damage or corrosion to the sheet, normally involved in the shipping and handling process. Overall length of the machine is 51 ft.; three 31-ft. rollers are mounted near floor level for easy feeding of sheet. Convair wasn't supposed to get the machine from the builder, Bertsch and Co., Cambridge City, Ind., until this spring. But Ford Motor Co. was to get one last fall which it couldn't use until spring. Ford, therefore, traded its delivery preference to Convair as a gesture of industry cooperation.

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More Briefs From IAS Sessions

These digests continue AVIATION WEEK's *presentation of subjects discussed at the 20th Annual Meeting of the Institute of the Aeronautical Sciences in New York, Jan. 28-Feb. 1. Other summaries appeared last week.*

Aerodynamics

▶ **The Effect of Non-Uniform Surface Temperature on the Transient Aerodynamic Heating of Thin-Skinned Bodies.** A. E. Bryson and R. H. Edwards, Research Physicists, Missile Aerodynamics department, Hughes Aircraft Co.

A quasi-steady analysis is given of the transient forced-convection heating of bodies with thin metallic skins, where the boundary layer is laminar, taking into account the effect of the non-uniform surface-temperature distribution on the rate of heat transfer. Lighthill's approximate theory of heat transfer to a non-isothermal surface is used and leads to the formulation of the problem in terms of a partial integro-differential equation solved in close form.

The results are compared with previous analyses in which the theoretical heat-transfer coefficient for an isothermal surface is used, and it is shown that this latter approximation leads to results in fairly good agreement with the more exact solution.

However, if heat transfer coefficients are calculated from the more exact solution, they differ greater from the ones predicted by isothermal surface theory.

This indicates that caution should be exercised in interpreting experimental data obtained by the transient method with a non-isothermal surface.

▶ **The Effects on Dynamic Lateral Stability and Controllability of Large Artificial Variations in the Rotary Stability Derivatives.** Robert O. Schade, Ordways B. Gates, Jr., and James L. Hassell, Jr., Langley Aeronautical Laboratory, NACA.

This paper includes the results of a combined theoretical and experimental investigation to determine the effects on dynamic lateral stability and controllability of large artificial variations in the rotary stability derivatives.

The theoretical work includes studies of the effects of large changes in the four rotary lateral stability derivatives both independently and in combination and of the product of the inertia parameter.

The experimental portion of the investigation included tests of a sweptwing model in the Langley free-flight tunnel to determine the effects on the flying characteristics of varying the derivatives both independently and in combination.

In addition to providing experimental data on dynamic lateral stability for correlation with theory, the flight tests provided an indication of the effect of the derivatives on controllability and general flight behavior.

▶ **On Weak Interaction of Strong Shock and Mach Waves Generated Downstream of the Shock.** Boa-Teh Chu, Graduate Student, Department of Aeronautics, John Hopkins University.

Analytical solutions are obtained for the flow behind an oblique shock produced by a wedge whose face is perturbed slightly from the straight line configuration. The solution is used to study the interaction of shock wave and Mach waves generated downstream of the shock.

It is found that Mach waves are reflected from shock wave without change of sign but with reduced amplitude. The "reflection index" approaches zero as the shock wave degenerates into a Mach wave and increases monotonically as the shock strength to a maximum of slightly less than unity.

The interaction of shock wave and Mach waves generated by a small protuberance on the wedge surface produces an almost similar image on the shock wave with the longitudinal and transverse scale stretched in proper ratio. The shock wave also behaves like a porous elastic structure which deforms under a simple stress-strain relation. The solution is applied to calculate the pressure distribution on a supersonic airfoil at large angle of attack.

▶ **Diffuser Efficiency of Free Jet Supersonic Wind Tunnels at Variable Test Chamber Pressure.** Rudolf Hermann, Professor, Department of Aeronautical Engineering, University of Minnesota.

The flow process occurring in the diffuser of a supersonic wind tunnel with free jet and its efficiency has been previously investigated by the author (A.F. Tech. Report No. 6334) for the special case where the pressure in the test chamber surrounding the jet is equal to the pressure in the exit cross section of the Laval nozzle.

The present analysis deals with the general case, where the test chamber pressure is different from the nozzle and exit pressure. An exact solution for one-dimensional inviscous, steady flow is obtained.

Diffuser efficiency and other flow parameters are calculated for variable chamber pressure in a Mach number range from one to ten. The mechanism of test chamber pressure control by means of the adjustable diffuser throat is shown. The stability of the chamber pressure is proved and a quantitative description of a "slow-starting" process of the tunnel is given.

Aeroelasticity

▶ **An Analysis of the Effect of a Power-Boost System on Wing-Torsion Control-Rotation Flutter.** Robert H. Barnes, Aeronautical Research Scientist, Ames Aeronautical Laboratory, NACA.

The results of a brief analysis to investigate the effect of a power-boost system on the flutter of a control surface are presented. Since flutter is essentially a condition of energy balance and a boost system is a source of energy the question arises as to the conditions under which the boost system can affect the energy balance.

A representative servo system in conjunction with an aerodynamic system of the simplest type was considered. A plausible feedback was introduced which caused signal changes to the power boost in propor-

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tion to the deflection of the fixed surface. The results were obtained by simultaneous solution of the equilibrium equations on an analog computer.

The results indicate that the concept of structural feedback cannot be ignored when making flutter analysis of control surfaces employing a power-boost system.

► **The Calculation of Spanwise Loadings for Oscillating Airfoils by "Lifting Line" Techniques.** M. A. Dengler, Research Engineer, and Martin Goland, Associate Director for Engineering, Midwest Research Institute.

The spanwise loading of an unswept, rectangular uncambered, oscillating wing is studied on the basis of two known quasi-surface theories and on the basis of a direct extension of the Weissinger "lifting line" model to the oscillating airfoil case. The elements of each procedure are carefully outlined to throw light on the physical mechanisms involved. Calculations by the various methods for a wing of aspect ratio 5, oscillating with reduced frequency 4 in six different spanwise symmetrical modes of motion, are then reported, and analyzed.

As a consequence of this work, a new "lifting line" model is deduced which should provide relatively accurate results in the study of the spanwise lift distribution of oscillating swept wings.

The accuracy of the results obtained by use of the new model should be comparable with that obtained with the Weissinger method, the two becoming identical when the former is reduced to the steady-state case. No direct studies of swept wings are included in the paper. Tabulations of certain extensions of the Circle F functions will be required before this can be accomplished.

Motorless Flight

(Joint Session in Cooperation with The Soaring Society of America, Inc.)

► **Boundary Layer Studies on a Sailplane.** August Raspet, Engineering Research Station, Mississippi State College.

Considerable effort has been expended in improving the quality of the flow in low turbulence wind tunnels. The goal sought in improving low turbulence tunnels is to equal the purity of the flow around an aerodynamic body in flight through the atmosphere. However it is only recently that the influence of noise as a disturbance to the laminar flow has begun to be seriously considered.

It is in these two respects that the sailplane offers a contribution as a tool for boundary layer studies. The flow studies can be made at a low noise level and in an extremely turbulence-free atmosphere. Two of the principal causes of transition are thus removed. Vibration of the aerodynamic surface can be kept low by suitable structure and the disturbances due to surface irregularities can likewise be minimized.

When a conventional airfoil NACA 4416 was investigated on a sailplane the transition on the upper surface was found to be at 44% of the chord from the leading edge. The conventional airfoil was behaving as a laminar section.

In addition to showing the results on the conventional airfoils, a study of porous suction on the same airfoil is described. By

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means of porous suction through holes pricked in the fabric it was possible to stabilize the laminar boundary layer at 84% of the chord.

As a conclusion the author shows that it is not difficult to obtain a very pure environment in which to study viscous aerodynamics on a sailplane. His results on the conventional airfoil and on porous suction bear out this conclusion.

▶ **On the Possibility of Soaring on Traveling Waves in the Jet Stream.** Joachim P. Kuettner, Air Force Cambridge Research Center, Geophysics Research division.

Sailplane flights and microbarographic observations indicate the existence of traveling waves in the jet stream with a period of 20 to 30 min. and a wave length of more than 20 km.

The theory shows that the wing profile of the jet stream provides a duct between approximately 20,000 and 40,000 ft. in which gravitational waves are trapped and can travel downwind with a velocity smaller than that of the jet stream. If the amplitudes of the waves are large enough the jet stream presents a new source of energy for sailplane flight by which gliders can travel over great distances with high ground speed.

Structures

▶ **Creep Buckling of Columns.** Charles Libove, Aeronautical Research Scientist, Langley Aeronautical Laboratory, National Advisory Committee for Aeronautics.

The creep of a slightly crooked H section column carrying a constant load is studied theoretically. The material of the column is characterized by a strain-time relationship, under constant uniaxial stress, of a form that was selected because it applies to at least two materials—75S-T6 aluminum alloy at 600F and a low-alloy steel at a temperature of 800F.

However, the analysis is intended for any material having creep properties of the same form and for which the material constants are known. A strain-time relationship under variable uniaxial stress is formulated from the constant-stress properties with the aid of Shanley's engineering hypotheses of creep.

The analysis leads to the conclusion that the lateral deflection approaches infinity—in other words, the column collapses—in finite time.

Results are plotted showing the maximum length of time the column can support a given load before it collapses and also shows the growth of deflections prior to collapse.

The results show the dependence of column lifetime on initial crookedness and on the closeness of the applied load to the Euler load.

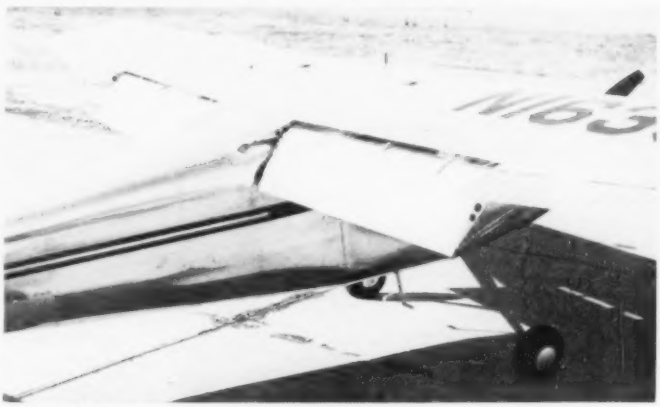
▶ **Analysis of Stiffened Curved Panels Under Shear and Compression.** M. A. Melcon, Group Engineer, Structural Methods and Dynamics, and A. F. Ensrud, Structures Engineer, Lockheed Aircraft Corp.

A method of analysis is presented which predicts the failure of the longitudinal stiffeners in stiffened curved panels or cylinders when the structure is subjected to shear (torsion) or combined shear (torsion) and compression. Simplified formulas are given for the initial buckling stress in shear of thin walled cylinders and curved panels. Curves are also given for the ultimate shear strength of the sheet in the buckled condition.

The method for predicting failure of the longitudinal stiffener in a shear loaded curved panel is not based upon an exact mathematical theory; however, an expression has been derived which gives the compression load for which the stiffener must be designed to withstand the effects of the diagonal tension field in the buckled curved sheet.

This method has been applied to a great many test specimens (loaded in shear and combined shear and compression) and there is very close agreement between predicted strength and actual failure.

CESSNA 170-B personal plane gets slower speed for short-field landings with . . .



SLOTTED FLAPS developed for L-19. Flap area is 12% of the total wing area.

Slotted Flaps Slow Cessna 170

Cessna's 170-B personal four-placer now sports a slotted flap which Cessna engineers say lowers the safe slow speed by 10% and permits steeper and slower approaches to be executed for short-field landings.

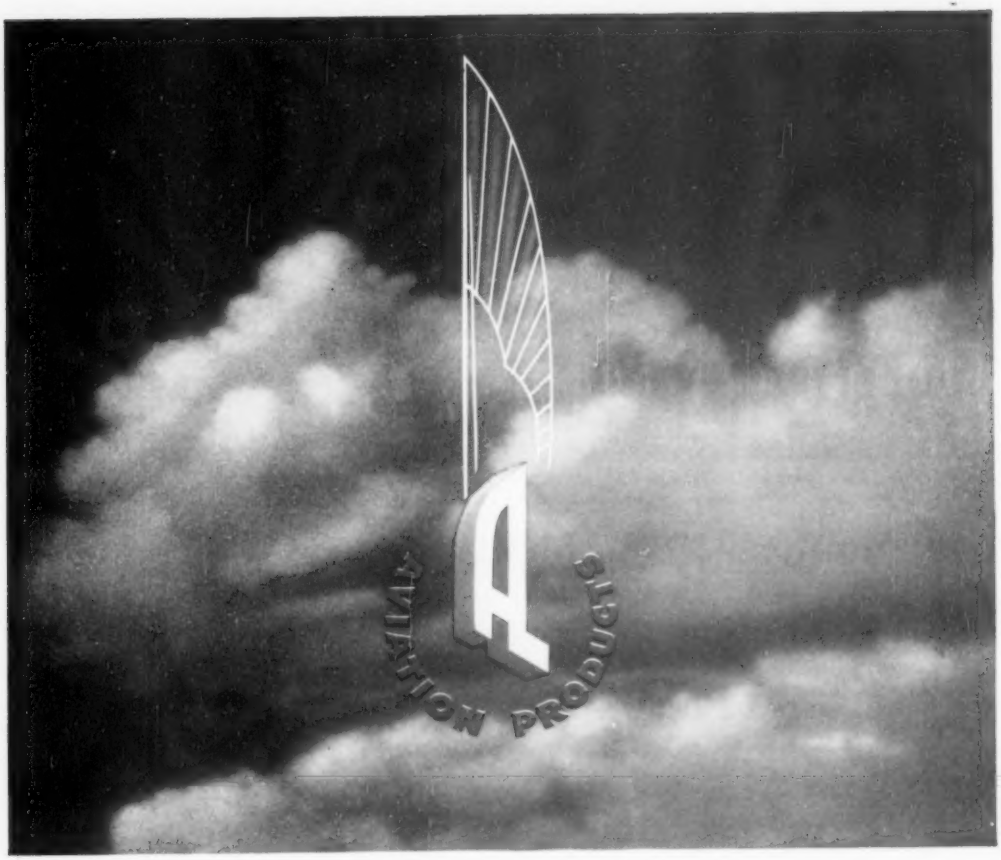
The flap was developed by the firm originally for its military liaison-observer L-19 Bird Dog. That installation was such a success that Cessna decided to use the same flap on the 170-B.

Other new features include redesigned control system and elevator and additional soundproofing. Powered by a 145-hp. Continental, the 1952 model cruises at over 120 mph., can carry more than 120 lb. of luggage and has a range of over 500 mi. No increase in price over previous models will be made, says the Wichita firm.

▶ **Classic Design**—Actually the Cessna flap is one of a series developed originally at the NACA and designated as the NACA 2h slotted flap. Total area of the flap is 21.2 sq. ft., which is about 12% of the total wing area of 175 ft sq. ft.

Flap operation is manual from the cockpit; four positions—0, 20, 30 and 40 deg.—are available to the pilot.

The new flap does not increase the rate of climb for takeoff, but does steepen the flight path in a climb. For short-field operation, a 20-deg. flap position is recommended. The plane gets off the ground at about 45 mph. with this flap angle.



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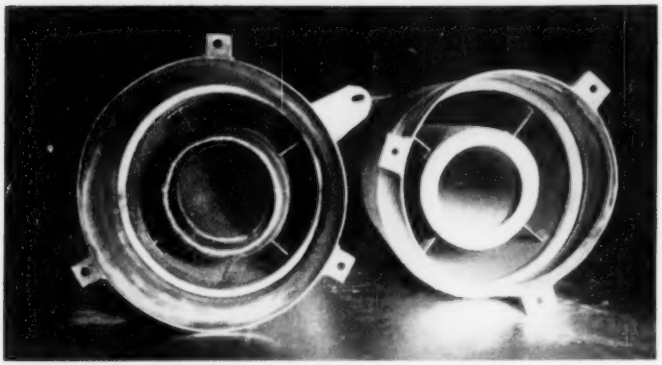

TUBE WITHIN TUBE arrangement in Aero Sonic Muffler helps deaden noise. Muffler at right is of 18 gage stainless; newer 24-gage one, left, resists heat better.

Noise Muffler Fails to Impress

Aero Sonic device on C-46 cuts sound somewhat, but not enough to swing airlines to its immediate use.

By Scott H. Reiniger

The airline industry has had its first chance to appraise Aero Sonic Corp.'s engine muffler for large transports in flight (AVIATION WEEK Jan. 21, p. 66). The demonstration took place at New York International Airport last month.

The verdict: The muffler cuts noise—apparently not enough to warrant its use on transport planes, but just enough to keep airline interest alive in future developments at Aero Sonic.

The demonstration consisted of a series of flyovers at altitudes from 200 ft. to 2,500 ft., by two C-46s, one of which was muffled. To this reporter, no reduction in noise could be noted at takeoff, and very little at 200 ft. But at 1,000 ft. and higher, there was a marked difference between the two planes. Decibel readings taken by New York Testing Laboratories, however, showed that the sound intensity from the muffled C-46 was less for all conditions.

The 60 invited witnesses, from industry, the armed services and civic groups, generally agreed that the muffler smoothed out the harsh, rasping sound of the engines.

Although airline reaction to this particular muffler was lukewarm, one representative stated his company would welcome an effective unit, not only to still growing complaints on the ground, but to promote air sales by making cabins quieter.

▶ **What the Industry Wants**—This is what the carriers told AVIATION WEEK they would want in a muffler:

• **No back pressure** in exhaust system caused by muffler. (Aero Sonic's device raises back pressure in C-46 engines an average of 1 in. Hg, CAA says.)

• **No power loss** as a result of using mufflers. (CAA agents say there is a slight power loss in the muffled C-46 which will require slight reduction in allowable gross weight of the plane. There's no such requirement, however, for a muffled DC-3 operated by Meteor Air Transport, say CAA, though back pressures in this plane are higher.

• **Cylinder head temperatures** must stay the same. (CAA says muffler has little or no effect on engine temperatures. Aero Sonic's chief engineer, Eddie La Tulippe says it actually cools. One airline engineer stressed a few degrees one way or the other in engine temperatures can have a big effect on engine failure rate.)

• **No effect on jet boost** action of exhaust systems existing in certain transport planes.

• **Lower weight.** (Present muffler installation on twin-engine C-46 weighs 200 lb.—total for four mufflers, 50 lb. each, two per engine.)

• **Long life.** (Meteor Air Transport service tests underway have not yet determined ultimate life of mufflers.)

• **Much better job** in cutting noise than shown by muffler in demonstration.

▶ **Not Applicable?**—Doubt was expressed by airline engineers that the C-46 muffler was even applicable, or could be modified for use on four-engine DC-6s and Constellation models fitted with multiple, "jet" type exhaust stacks designed to boost speed of planes. As many as eight of these pipes, in clusters of four, are used on a single engine. One powerplant man also stressed it would be difficult to put the unit on Convair 240s.

But La Tulippe believes an improved version of the device can be adapted if the airlines want it.

He plans to substantially reduce

NACA Gloomy on Cutting Air Noise

While airlines and civil aviation officials are seeking means of cutting down adverse aircraft noise effects on communities around airports by changing approach patterns, little hope is held out by the top U. S. aviation research agency, NACA, for practical sound deadening of modern high-powered engines and propellers at the source.

Basically, the problem is as simple as this:

To get the high powers needed for aviation's modern high speeds and efficient load-carrying, it is almost impossible to avoid noise. If you quiet the powerplant, you cut down the power. It follows that the limit of human noise endurance may be a very real limiting factor on the higher powers of jet and rocket engines, and supersonic propellers.

Harvey H. Hubbard and Leslie W. Lassiter, NACA scientists, last month reported to the Institute of the Aeronautical Sciences in New York findings based on NACA aircraft noise research.

Here are some of their conclusions:

• No easy and inexpensive solution to the aircraft noise problem is presently available. Reductions of noise at the source are possible in some cases, such as the propeller and reciprocating engine, but only if performance penalty is acceptable.

• Jet engine noise increases in intensity with jet velocity, density and turbulence.

• A decrease in propeller sound intensity can be achieved by using more propeller blades, but decrease is greater at lower tip speeds than at higher ones. Wider blades may cause some reduction in intensities in the supersonic range, particularly for higher harmonics.

• Principles of muffling small aircraft engines are well known, but additional research and development is needed to produce satisfactory muffling for larger engines.

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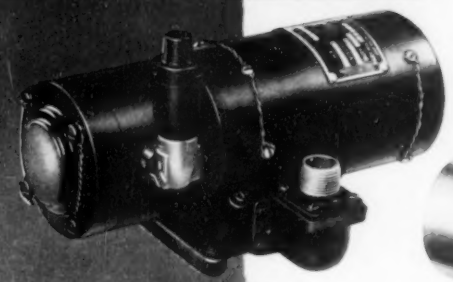
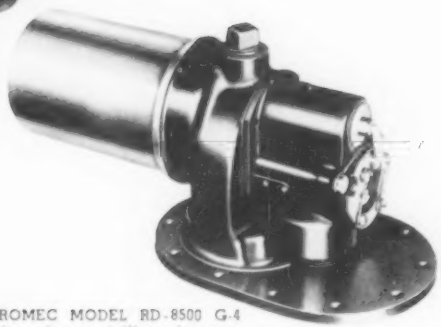
LEAR-ROMEC AIR COMPRESSORS and LEAR-ROMEC precision engineered WATER INJECTION PUMPS were selected by FAIRCHILD Engine and Airplane Corporation for the C-119, Flying Boxcars. The C-119, known as the FAIRCHILD PACKET, is used extensively in airlift operations by the Combat Cargo Command of the U. S. Air Force.



LEAR-ROMEC MODEL RD-6160 AIR COMPRESSORS is one of a new series of oil-free dry-air compressors for pressurizing radar installations in high-altitude aircraft. Designed to USAF specifications this series replaces the old-style rotary gear pumps. These compact high capacity units are self-lubricating for continuous duty. LEAR-ROMEC compressors are available with Lear DC motors or Lear AC motors.



LEAR-ROMEC MODEL RD-8500 G-4 is a fully submerged Water Injection Pump for antidetonate installation. The total immersion of these pumps simplifies installation and requires no external room for mounting, protecting the equipment from possible damage. The unit is engineered for temperature ranges of —65° F to + 160° F.

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Muffler Scoreboard*

Altitude	Noise Level in Decibels—Without Mufflers	With Mufflers
Readings taken on open field at airport		
Takeoff (course offset)	103	102½
200 ft. (overhead)	103	102
500 ft.	95	95
800 ft.	92	92.5
1000 ft.	94	93
1500 ft.	90	89
2500 ft.	86	84.5
Indoors with windows open —in apartment house near field		
500 ft.	82	76
800 ft.	80	76
Outside apartment house near airport		
500 ft.	94	92
800 ft.	95	92

*Two twin-engine C-46 transports, one with, the other without mufflers, flying at 60% (cruise) power, and using P&W R-2800 engines rated at 2000 hp. at full power.

weight, raise heat resistance, and, perhaps, increase sound deadening of the C-46 muffler by using a lightweight, high-heat-resisting, stainless steel-titanium alloy in future models. With this metal, he explains, he can cut in half the 200-lb. weight of the present C-46 installation, or keep some of the weight and add to the length of the device for greater noise reduction.

► **DC-3 Muffler**—The Acro Sonic muffler was first approved for transport plane use in a DC-3 operated by Meteor Air Transport (AVIATION WEEK Sept. 17, 1951, p. 38). CAA okayed this installation last year under a Repair and Alteration Form 337. This approval, essentially a means of insuring modifications by individuals are safe, does not

"ANTI-ZOOMING" prop cuts noise considerably, developer La Tulippe claims.

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MIL-S-5626	Bars	4140	Rounds, Hex's, Flats, Billets, Annealed, Normalized
MIL-S-6758	Bars	4130	Rounds, Squares, Hex's, Flats, Billets, Annealed, Normalized, Normalized & Tempered, Heat Treated
AMS 6324	Bars	8740 Modified	Annealed Rounds
AN-QQ-S-685	Strip	4130	Annealed & Normalized
AN-S-11	Strip	1020-25	

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	Sheets	Type 304	2D Finish
MIL-S-6721	Sheets	Type 321	2D Finish
	Plates	Type 321	Hot Rolled, Annealed & Pickled
MIL-S-7720	Bars	Type 303	Rounds, Squares, Hex's
AMS 5510	Sheets	Type 321	2D Finish
AMS 5521	Sheets	Type 310	2D Finish
AMS 5610	Bars	Type 416	Rounds, Squares, Hex's
AMS 5640	Bars	Type 303	Rounds, Squares, Hex's
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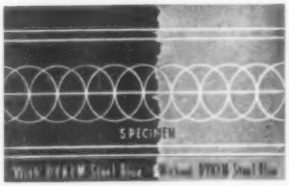

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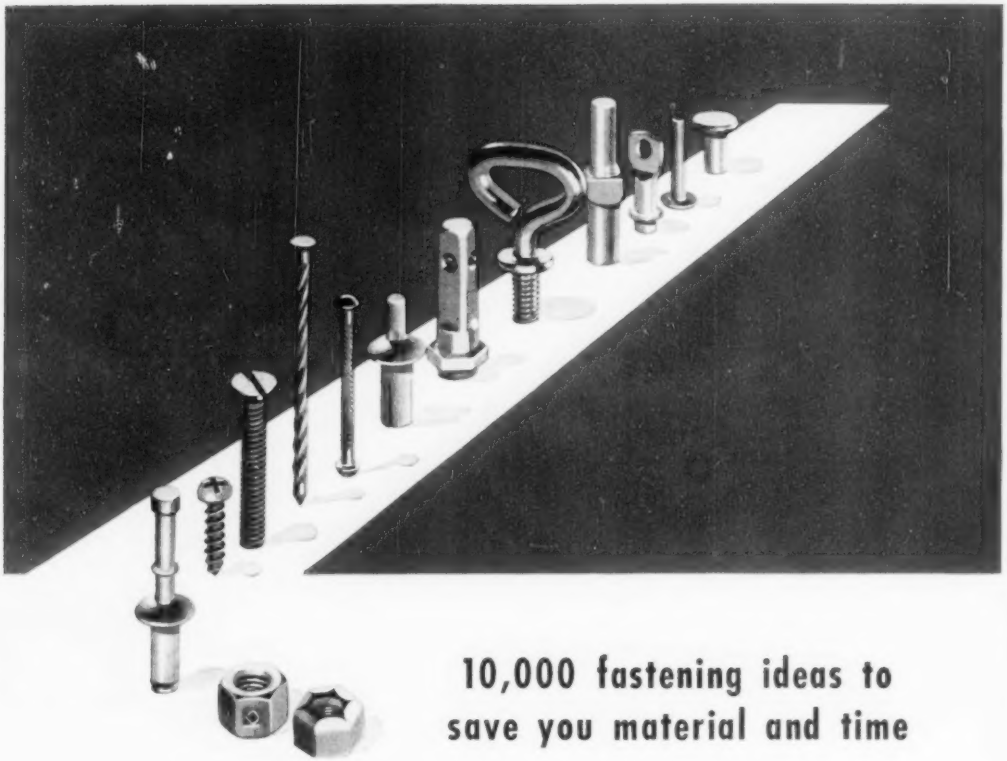

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DC-3 MUFFLER involves no weight penalty, replacing section of exhaust pipe.

attest to the efficiency of the device as a noise deading medium.

Mufflers in the C-46 and DC-3 are essentially the same.

As a result of service test experience with the early DC-3 prototype, new mufflers are made of heavier 18 gage stainless steel, replacing 24 gage, to resist heat better. The present DC-3 rig involves practically no weight increase, since it replaces the exhaust pipe that formerly attached to the engine collector ring.

Previously the pipe was retained and the muffler attached to its aft end. While this meant additional weight and projected the muffler considerable behind the engine, La Tulippe feels it provided better sound deadening.

▶ **Muffler Details**—The present muffler consists of a series of tubes within tubes perforated and lined with steel wool to trap sound waves. A "ball" partially obstructing the outlet helps bounce sound waves back into the tubes. The outlet is venturi-shaped at the extreme end to speed ejection of gases, thus keeping back pressures down.

A "wall" of fresh air, intended to prevent after-firing, is introduced into the device by a special scoop. Mufflers measure 8 in. o. d., kept at a minimum by the tube-with-in-tube arrangement.

▶ **The Demonstration**—In the Idlewild demonstration, the two C-46s, powered by 2,000 hp. Pratt & Whitney R-2800s, flew overhead at 60% cruise power, each engine developing about 1,200 hp. at 2,300 rpm. and 35 in. Hg manifold pressure.

CAA agents were aboard both planes to ascertain that operating conditions were equal. Sound track recordings were taken both outside on the field and indoors in apartment dwellings nearby by Professional Cine and Camera Equipment Co.

On sound track recordings taken indoors, the difference in noise between the two planes was greater than that heard outside. This was borne out later by decibel meter readings.

At least part of the disproportionate reduction indoors could be attributed to the fact that the muffled plane flew slightly off course over the apartment building where the sound recorder was located. But aside from this, there was evidence the muffler tended to damp out the lower frequency range of sound waves, those "that penetrate the walls of buildings most easily," as New York Testing Lab described them.

▶ **Small Unit**—Most startling difference in noise, heard after the demonstration, on sound tracks rerun for the gathering, was that between a muffled and unmuffled Howard aircraft which had been demonstrated to congressmen earlier at Teterboro. This muffler, smaller than that on the C-46, quieted the single P&W 450 hp. Wasp Jr. engine used in the plane, to an extent that would indicate considerable potential for the unit in executive aircraft. La Tulippe says it has given more than 500 hr. trouble-free service so far.

▶ **Flapping Prop**—La Tulippe is also developing an anti-noise prop—"anti-zooming" prop, he calls it—to go with his mufflers. Blades on this prop flap, like a bird's wings. They can swing back and forth from upright 90-deg. position to about 60 deg. forward.

La Tulippe has already tested this new prop on his 450 hp. Howard. He hopes to build one for larger planes.

Among the distinguishing features of the anti-zooming prop:

- **Forward swinging blades** to reduce vibration. When plane is braked prior to takeoff roll, blades are forced forward like braces of an inside-out umbrella.
- **Pitch controlled** by blade swing. Fore and aft swinging causes blades to turn, changing the pitch.
- **Slotted strip** on leading edge of wing acts as "air director" so blade does not strike air flat, thus avoiding what La Tulippe calls "zooming noise."

▶ **Representatives**—Among airlines represented at the demonstration were American, Trans World, Capital, BOAC and KLM. Representatives of Air Transport Assn., Wright Aeronautical division of Curtiss-Wright Corp., and Sikorsky Aircraft division of United Aircraft Corp. also attended.

While the noise-killing powers of the new muffler were not impressive to most observers, a number stated it was decidedly a step in the right direction. And they noted that it took a Brooklyn manufacturer little known to aviation leaders, Aero Sonic, and a small contract carrier, Meteor Air Transport, to take the first tangible steps to eliminate noise in operation of large transports.

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LOUNGE, set off from cabin by Plexiglas panels, is Cal Central Martinliner feature.

Cal Central Likes Its 2-0-2 Fleet

Airline reports Martin coaches popular with pilots, passengers; plans hourly L.A.–S.F. service.

By George L. Christian

Burbank, Calif.—Introduction of five Martin 2-0-2s into California Central Airlines' high-density coach traffic routes has produced startling results for the carrier.

Number of passengers carried in 1951 soared 55% over the 1950 figure, and passenger miles jumped 43%.

Average load factor for last year was 63%, and on the popular Los Angeles/Burbank-San Francisco/Oakland run the figure pushed past 80%.

The fare between these two points on Cal Central is $11.70. Railroad coach costs $11.84. Time comparison: CCA—88 minutes; train—about 12 hr.

▶ **Popular Martinliner**—Colonel C. C. Sherman, Cal Central's president, attributes much of his airline's success to immediate public acceptance of the 2-0-2s, (dubbed Martinliners) that CCA bought from Northwest Airlines.

This was first-class service at popular prices and the flying public went for it in a big way.

A month after the planes were put into service (October, 1951) the airline carried 14,028 passengers. Two months later, the monthly total was 16,707 passengers. In one day, four Martinliners, with limited assist from one DC-3, hauled 1,034 people.

The Martinliner is proving as popular with the crews as with the public, C. L. Stout, the airline's chief pilot, told AVIATION WEEK. On a test hop, he showed this reporter a perfectly stable descent made with gear down, flaps in takeoff position. Rate of descent was 1,700 fpm. but airspeed held at a constant 155 indicated. From a flight operations, maintenance and line servicing standpoint, the airplane stacks up favorably with comparable equipment, a company spokesman said. Utilization, after only four months of operation, averages over six hours on weekdays and hits ten hours over weekends and holidays. To date CCA has not experienced a single case of engine failure on the plane's Pratt & Whitney R-2800s.

▶ **Present**—CCA did not lose any time instituting new features to heighten the appeal of its new, highspeed Martinliner fleet.

Major innovation was installing an eight-passenger "Air Lounge" in the forward part of the cabin. The compartment is in addition to the existing 36 seats, raising total capacity of the plane to 44.

The lounge is partitioned off by edge-lighted, transparent Plexiglas panels. Removable tables may be set up between the two pairs of facing seats. Currently, the airline serves complimentary snacks, cokes, coffee, chewing gum and cigarettes.

The integral tail passenger loading ramp which speeds embarkation and debarkation, and the carry-on baggage racks that reduce waiting for luggage at destination are proving popular with passengers. So is Cal Central's excellent record for on-time performance.

▶ **Future**—Here are some of the ideas CCA has up its sleeve to make the service still more attractive to its passengers.

• **Plane-to-ground telephone.** The airline is seriously considering such an installation for passengers who might have urgent need to communicate with office or client.

• **Cocktail service.** Having an eight-seat

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lounge, cocktail service would be a natural. And being an intrastate carrier, Cal Central would have only one set of state regulations to abide by.

• **Hourly service.** Company officials said that in the not too distant future they hope to run flights between Los Angeles and San Francisco every hour on the hour—except, possibly, in the middle of the night.

• **Route extension.** The carrier some time ago applied to Civil Aeronautics Board for permission to inaugurate service to the "gold mines" of Las Vegas and Reno. Although still not approved, Col. Sherman says "it will come."

▶**Young Line**—Cal Central is a young airline—its first flight took to the air on Jan. 2, 1949. And it is probably the only "husband & wife" scheduled airline in the business. Sherman is founder and president, his wife, Edna is secretary-treasurer. She watches the dollar sign closely, since passenger fares are the sole source of CCA revenue. In addition to the $11.70 Los Angeles-San Francisco fare, the carrier charges $5.55, Los Angeles-San Diego (CCA's Martinliners scoot down the coast in 33 min.).

Another convenient Cal Central service is the shuttle route between Los Angeles International Airport and Lockheed Air Terminal, Burbank. Most north-bound flights from San Diego and south-bound flights from San Francisco land at both fields. Scheduled flight time is 15 min. and fare is $1.95. On the road, the trip can take 1½-2 hr.; by cab it costs about $7.5.

A longer-range commuter service has just been inaugurated by Cal Central. "Sunrise" flights now take off from Los Angeles nonstop to San Francisco every morning except Sunday at 8:00 a.m., arriving at destination at 9:35. Return flight departs at 4:00 p.m. and lands at 5:35, allowing passengers to spend a full working day in the Bay area.

A version of the "family plan" recently put into effect by the airline allows children over two and under 12 years of age to travel at half fare on Tuesdays, Wednesdays and Thursdays.

▶**Firsts**—Cal Central officials proudly point to these "firsts" claimed by their airline.

• **First to inaugurate** coach fare service between L.A.-S.F.

• **First to supply** regular commercial airline service to Edwards AFB (Muroc) and Inyokern Naval Air Test Center. Two roundtrip flights operate daily to these military establishments.

California Central, which calls itself a scheduled, intrastate airline, looks to the future with confidence. It feels its fleet of modern, highspeed aircraft will help it beat its 1951 record year, when it flew 145,105 passengers 41,245,825 passenger miles.

Messenger of Mercy—Carrying doctors and serum, a lone Sikorsky R-5 helicopter of the Air Rescue Service is credited with checking a yellow fever epidemic which was threatening to sweep Costa Rica last fall.

Operating from a makeshift base in the northern part of this Central American republic, the helicopter covered 6,000 square miles of remote territory in a 13-day period in good weather and bad.

During 42 landings, many of them in small tropical clearings, doctors were able to inoculate 978 natives—and though 31 had perished before the helicopter flew in with medical aid, not a single death from the fever was recorded after its arrival.

Other peacetime missions performed in recent months by Sikorsky helicopters include the evacuation of 140 flood victims in Argentina . . . food air-drops in the Kansas City flood region . . . and help for flooded-out inhabitants of the Po River Valley in Italy.

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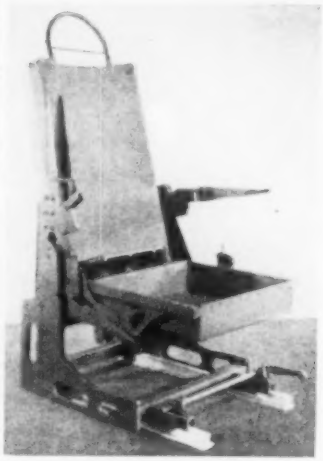


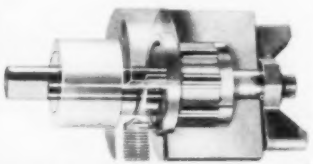
USAF Plane Seat

A new pilot's seat for military aircraft, being considered for use in the Fairchild C-119 Packet and Chase C-123 Avitruc, has been announced by Aerotherm Corp.

The seat is built to USAF Spec. 25285 and, according to the firm, has been successfully tested to support a back and side load of 1500 lb. and a down load of 4000 lb. when it is fully reclined and in the highest vertical position. The seat is adjustable 7 in. vertically and can be moved 6 in. fore and aft on tracks. To recline fully, back swings to a 53½ deg. position, from a normal of 13½ deg. The seat is stressed for a harness load of 2880 lb. plus an 1800-lb. belt load.

Magnesium, steel and aluminum alloys are used to make up "an extremely flexible" seat frame, says Aerotherm. Cushions are rubber-padded, canvas-covered "Plasti-cel" types. Seat cushion is interchangeable with a survival kit. The installation weighs 50 lb. completely equipped.

Aerotherm Corp., Bantam, Conn.



Roller Pump

"Magna-Mite," a new type of positive displacement pump for handling gasoline, hydraulic fluid, lubricating oils and similar products, has been developed by Milwaukee Hydropower, Inc.

The pump is similar to vane-type units, with an important exception. Rollers are used in place of vanes. This change increases pump life three to four times, the company says. The rollers contact the outer case as in a roller bearing, and rolling friction replaces sliding friction present in vane pumps.

The pump is available in three main types: constant displacement; ajustable displacement; variable and reversible displacement. With the latter, flow can be stopped or reversed automatically or manually with the pump still continuing to operate in one direction. All pump models operate in either direction of rotation.

They have a speed range from 300 to 3,600 rpm. and a capacity of less than ¼ to 1¼ gpm. The units measure 2¼ in. diameter and 6 in. length, and are built to close tolerances, according to the maker.

Rivet Solves Problem

A tough new blind rivet, for high-strength applications in aircraft, is being produced by the Deutsch Co.

The rivet originally was conceived by North American Aviation, Inc., to help engineers and production men see their way through some tough assembly problems.

Approval for limited application of the rivet in Air Force planes has been obtained, says the firm. Its use is confined to assemblies where conventional high-strength fasteners ordinarily would be used, but cannot because of the inaccessibility or blind nature of the installation.

Some advantages listed for the part, called the Barker Blind Rivet are: light weight combined with high strength; capacity to be driven into blind holes in forgings or fittings; minimum side

clearance needed for the rivet on the blind side of the work.

Available in countersunk or protruding head types, the rivet consists of two parts, a 4130 steel pin and a stainless steel or aluminum-alloy sleeve. It has satisfactorily passed corrosion and fatigue tests, says the firm, and is supplied in diameters of 3/16, 1/4, 5/16 and 3/8 in. and in lengths up to about 2 in.

The Deutsch Co., 7000 Avalon Blvd., Los Angeles 3, Calif.

Flexible Metal Hose

A new flexible metal hose, developed primarily to carry gases or liquids under high-temperature conditions, is being produced by Titeflex, Inc.

Made of bronze, the hose is seamless and is said to have resistance to corrosion and abrasion, and to be an ideal vibration eliminator.

The product, called "Uniflex," is of helical construction and distributes flexing loads between the inner and outer convolutions, permitting greater flexibility and longer life, Titeflex explains. When additional protection is desired, the hose is produced with a covering of one or more layers of tensile bronze wire braid.

Titeflex, Inc., 500 Frelinghuysen Ave., Newark 5, N. J.

ALSO ON THE MARKET

"Ten-X," for sealing windshields and other areas on aircraft, is said to withstand extremes of weather, remain unaffected by vibration and temperature change and adhere to practically any dry surface, including rubber, metal, glass and wood. Electro Cote Co., St. Paul, Minn.

"VB 282" fast-drying black primer for military plane instruments and other equipment, securely anchors protective surface coating even to polished chrome, according to maker. The vinyl-base undercoating resists salt spray, humidity, abrasion and solvents, air-dries in 15 min. United Lacquer Mfg. Corp., 1001 W. Elizabeth Ave., Linden, N. J.

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A handsomely appointed case of the finest leather especially designed to match the meticulously engineered AVIOX. The beautiful AVIOX assures complete comfort and safety for up to four passengers at higher, smoother, more economical altitudes—with no permanent weight penalty.

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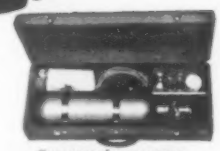

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- Simple directions, easy to follow—are included.
- Operated in flight by pilot, or passengers.
- Portable, the Aviox is not permanently fastened in the aircraft. It is treated as luggage, therefore, C.A.A. Weight and Balance data is not required.

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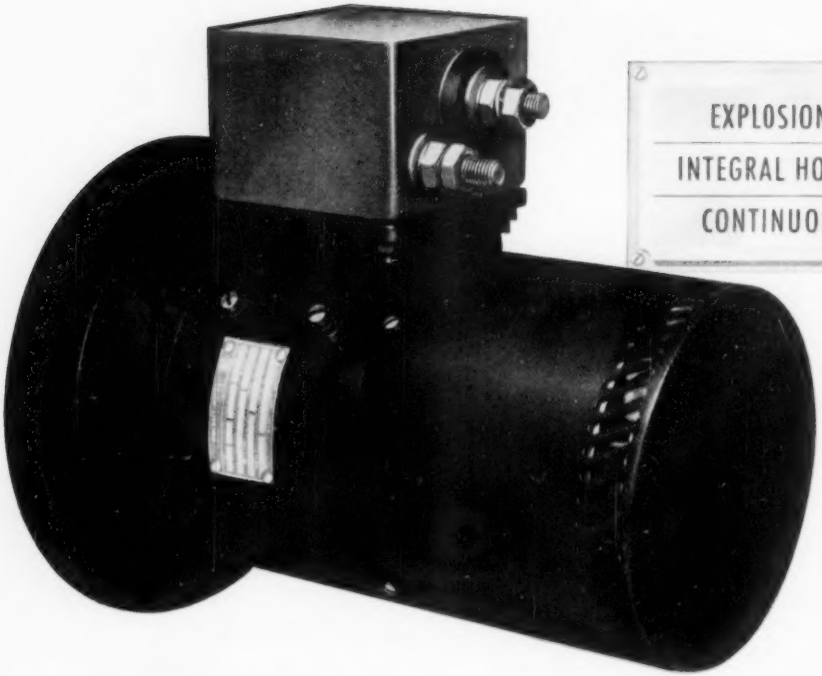
AVIOX by Scott

SCOTT AVIATION CORP.
225 SAW STREET LANCASTER, N. Y.



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Now you can have a lightweight, continuous-duty, explosion-proof motor. This new construction in integral horsepower ratings represents another Westinghouse first in the Aviation Industry.

This revolutionary d-c motor is completely self-contained. No ducts or other external ventilation equipment is required. Special flame arrester design provides complete protection and permits continuous-duty operation . . . with only a slight increase in weight over corresponding open, self-ventilated motors.

These direct drive motors cover a range from 1 to 4 horsepower and weigh from 20 to 28 pounds. They are available with standard AND mounting pads or with special mountings. Radio noise filters are installed. This new design has been explosion-proof tested according to USAF specifications.

Look into this new motor. Call your nearest Westinghouse Office or write Westinghouse Electric Corporation, Aircraft Department, Lima, O.

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EQUIPMENT

Newest Merger to Link Northwest, Capital

- **Combined company would have 26,000-mi. system; early approval by stockholders, CAB predicted.**
- **Proposed consolidation is largest in current group of airline merger plans being evaluated by CAB.**

Latest and biggest airline merger in the new series that promises to re-make much of the U. S. airline route and economic structures is the proposed Northwest-Capital Airlines union. Observers expect prompt stockholder approval will be followed by Civil Aeronautics Board's blessing within the year.

Northwest President Croil Hunter is slated to be board chairman and Capital President J. H. Carmichael to be president of the new giant 26,000-mi. international airline. Corporate name is Northwest-Capital Airlines.

Capital and Northwest stockholders will exchange their old common shares for common stock certificates of the new airline on a one-for-one basis. Closing prices were almost identical on the New York Stock Exchange a few hours before signing of the merger contract the evening of Jan. 31. Prices then were: Capital 16¼ and Northwest 16⅜ a common share.

▶ **Preferred Stock**—Northwest's 384,845 shares of 4.6% cumulative convertible preferred stock will be assumed as an obligation of the merged company. Capital has no preferred stock outstanding.

Application for approval filed with the CAB asked for expeditious consideration and approval in view of the "tremendous potentialities of the proposed merger in serving the public interest and national defense."

Active Northwest-Capital merger negotiations flared up Jan. 20 and were rushed to completion in only ten days, following a year-long lull. The two lines almost closed a similar deal over a year ago.

Northwest-Capital may become the nation's third largest airline, stretching from the East and Gulf Coasts all the way westward through Seattle-Portland, Alaska and the Aleutians to Korea and Japan—plus a spur route to Hawaii from Seattle-Portland. The system is also in a favorable position to inaugurate over-the-North Pole flights to Europe, although it has no such certificate now.

▶ **Financial Structure**—The merger is also expected to strengthen the financial picture for both lines. At present the two airlines are competing between Minneapolis and East Coast; and they are both burdened by route restrictions designed by CAB to protect each from the other all along the way. Merger would improve their present situations in several important traffic markets, including Minneapolis-St. Paul, Milwaukee, Detroit, Cleveland, Chicago, Pittsburgh, New York and Washington.

Pooling of their resources should also make for better equipment and personnel utilization in the near future, and a better new-plane-buying program later on.

The two lines now operate a total of 47 Douglas DC-4s, 10 Boeing Stratocruisers, five Lockheed Constellations, 30 Douglas DC-3s and three Super DC-3s. Capital will have 12 Constellations by 1954.

▶ **Five Mergers Pending**—The entire U. S. scheduled airline route pattern is changing. Eight trunk lines and two locals have signed merger agreements and more are expected this year.

CAB is expected to approve three of the four trunk mergers plus those of the local service lines. Mergers up for CAB approval are Northwest-Capital; Braniff-Mid-Continent; National-Colonial; Delta-Northeast; and West Coast-Empire. Only Delta-Northeast is expected to meet CAB opposition.

This merger series leaves only three smaller trunk lines without firm merger plans: Chicago and Southern, Continental, and Western.

The Mid-Continent agreement with Braniff last month appears to isolate Continental. CAB previously had ordered Mid-Continent and Continental to show cause why they shouldn't merge. But Mid-Continent had trouble getting together with Continental and turned to Braniff instead.

▶ **More Mergers Coming**—CAB experts look to several acceptable plans for the smaller lines that do not have positive mergers in the works now. Two high CAB officials have mentioned the following possibilities: Continental could merge with either the new Braniff-Mid-Continent group or with Chicago and Southern or Western or one of the big four—American, Eastern, TWA or United. Chicago and Southern possibilities cited by CAB include merger with Continental, Delta or Capital.

CAB hasn't tried yet to figure debate merger proposals for Western, which is doing pretty well on its own right now. Some officials believe Western should merge, sooner or later, however, as insurance for subsidy-less days ahead. But the situation in Western's territory makes merger a complex subject from a CAB standpoint.

Western offers necessary competition

Merger Plans

Here is a brief outline of the territories covered by pending airline merger proposals:

- **Northwest-Capital.** From East and Gulf Coast to the Midwest to Seattle-Portland, thence to Alaska, the Aleutians, Tokyo and Korea; also a spur from Seattle and Portland to Hawaii.
- **Braniff-Mid-Continent.** Essentially a north-south system covering the central U. S. from Chicago, Denver and other north central cities to New Orleans, Houston and other Texas cities; then on south to Mexico City, Havana, Balboa and South America.
- **National-Colonial.** North-south system in eastern U. S. from Montreal southward via New York to Miami and the Gulf Coast, plus a spur route to Bermuda from New York and Washington.
- **Delta-Northeast.** These are widely separated systems, with Northeast serving New England and New York City while Delta operates east-west from Miami and Atlanta through the Deep South to Texas cities. Merger is contingent on acquisition of a linking route from the Deep South to New York, since CAB opposes big route shake-ups like this; observers see this merger as contingent on acquisition by Capital of a southern route or a further merger hook-up with a north-south airline like National.
- **West Coast-Empire.** These are local service airlines serving the states of Washington, Oregon and Idaho.

for United, so CAB is not likely to approve a Western-United merger. Yet a Western-Continental merger might not strengthen Western, so CAB may not see much advantage in that. Conceivably, one official says, Western might merge with the Northwest-Capital coalition.

► **Other Possibilities**—Meanwhile, the Board has started the New England-Southern States merger investigation to consider merger possibilities for all Eastern U. S. lines except Eastern itself, which already is considered strong. Colonial and National have agreed on merger terms. So have Delta and Northeast, but their agreement is contingent on a Delta route extension from the Deep South to New York to join the two systems. CAB is on record as opposing the grant of any such major new routes. Observers see two possibilities for consummation of the Delta-Northeast deal: buy all or part of Capital's southern routes or else merge with National.

But there are many possible combinations for merger. Those mentioned are only the most prominently suggested in CAB circles.

Common Fare Set For West Coast

Airlines are now authorized to go on charging identical fares for tickets from Chicago to any West Coast city although the distances vary. Civil Aeronautics Board reversed an examiner opinion in making this decision.

This winds up a Board investigation into whether or not the existing "common fares" structure on the West Coast should be changed to a fare structure based on mileage.

CAB notes that the West Coast economy has become geared to this common fares set-up on rail, bus and plane travel for many years. "All (West Coast cities) will compete equally insofar as the more important passenger rates from the East are concerned," the Board states in its decision.

► **Favor Common Fares**—The Board points out that business has developed on that basis; extensive investments would suffer if fares were changed to reflect different mileages flown, CAB says.

Los Angeles is closest to Chicago. So it would appear that Los Angeles would gain by a switch to fares based on mileage alone. But Los Angeles, as well as other West Coast cities and civic bodies, intervened in the case, unanimously favoring the common fares structure, CAB says.

Explanation is that the common fares structure allows passengers to take alternate routings to several West Coast cities with unlimited stopover privileges along the way, all for the standard price to West Coast destination. Promotion of this package-type fare structure is credited with bringing more business for all.

► **Coach Fares**—First class air fare Chicago-West Coast is $113.75 to any city from San Diego northward to Seattle.

Although common fares are now in effect to West Coast cities on first class, the coach set-up has been modified this winter. Northwest, serving the Seattle area, has not gone along with the coach fare cuts of American, TWA and United, which also serve the California cities. New coach fare structure is $75 to Los Angeles or San Francisco but the old $88.35 to Seattle.

Northwest may cut its coach fares to the northwest area, in line with the recent CAB policy; but observers don't expect Northwest to lower its coach fares down to the new $75 rate to California.

Aussie Air Cargo Setting Records

(*McGraw-Hill World News*)

Melbourne—The rapid development of air cargo in Australia is shown in figures just released by the Australian National Airways.

In 1951 this line alone carried 78,228,578 lb. of air freight or 13 million lb. more than in 1950. The total amount of freight carried by ANA since it first started its air cargo service in 1936 is now 285 million lb. But since June, 1951, each month has been a record one, averaging 7 million lb. per month.

ANA operates 112 scheduled freighter flights per week and approximately 25 special flights over its 11,176 route miles in Australia. Bristol Freighters and DC-3 freighters are used.

African Carrier Buys 8 Macchi MB 320s

(*McGraw-Hill World News*)

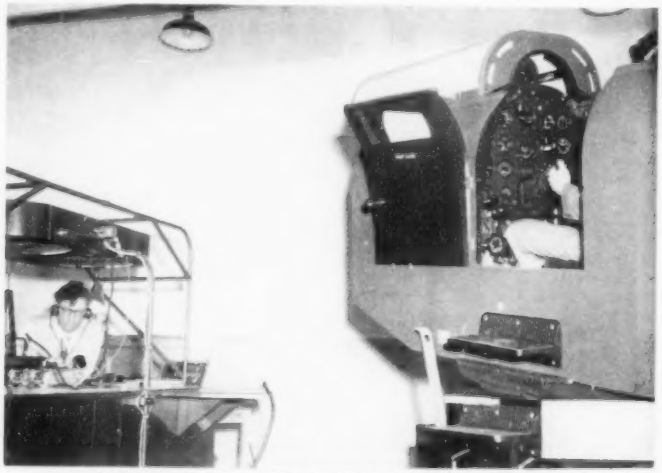
Rome—East African Airways Corp., Nairobi, has ordered eight 2-engined Macchi MB-320s for service on feeder-lines linking up with the main cities in Kenya, Tanganyika, and Uganda. The planes were sold for £70,000 sterling each (approximately $196,000) and are scheduled to be delivered in the next two months.

The director-general of East Africa said he had had favorable technical advice from BOAC in Italy as to the good qualities of the MB-320 for the carrier's purpose.

The MB-320 carries five passengers, has a useful load of 1,675 lb., cruising speed of 175 mph.

The company preferred Macchi 320s to many other types—including English and American—not only for their particular characteristics, but also because of the quick delivery.

Put Your Scrap Back to Work



AUSTRALIAN CARRIER BUILDS FLIGHT TRAINER

Technicians of the Australian National Airways, Pty. Ltd. have designed a unit to give the airline's pilots thorough, synthetic flight training. Called the AT-20, the trainer incorporates automatic radio range, ILS and DME navigational equipment. The ground station incorporates two precision-driven potentiometers, controlled by the instructor, to simulate the distance from plane to the DME ground station selected.

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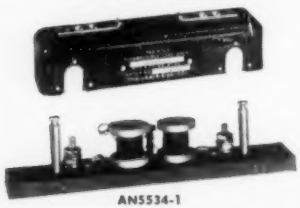
IRON CONSTANTAN — Figure A, lead-wire to specification AN-W-8. Available in type II or III class A or B. Thermocouple wire supplied in AWG sizes from 18 to 30 to Bu Stds RP1080.

COPPER-CONSTANTAN—Figure B, lead-wire used with chromel-alumel indicators, effects considerable saving in weight over chromel-alumel leads of same resistance. Available in AWG sizes or with special stranding to seven ohms per 200 feet.

CHROMEL-ALUMEL—Figure C, lead-wire to specification AN-W-29. Available in types I, II or III class A or B. Available with stainless steel overbraid. Thermocouple wire available in AWG sizes 16 to 24.

Write for data on any of above or wire to new MIL specifications.

ACCESSORIES FOR TEMPERATURE INDICATORS



AN5534-1

Developed by Lewis, the AN5534-1 resistor block is used to adjust the overall external resistance of the indicator to eight ohms.

AN5537-1

Another Lewis development, the AN5537-1 Firewall Connector Block provides a quick disconnect for thermocouple engine leads. Available with angle plugs as part AN5537-2.

TERMINALS FOR THERMOCOUPLE LEADS

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Manufacturers of Complete Temperature Measuring Systems for Aircraft

NAUGATUCK, CONNECTICUT

Civil Air Training Program Aid Sought

A Congressional stimulant is being planned to try and revive the fast-fading civil aviation training schools, if the various segments of the aviation industry and government agencies can formulate the medicine.

Presentation of a gloomy statistical picture of the decline of aviation technical training in the U. S. from official CAA records at a technical training conference last month in Washington has brought about some results in official quarters.

Labor Secretary Maurice Tobin has suggested the formation of regional task groups to survey requirements for trained aviation manpower and the possibilities of augmenting existing training programs.

► **Mechanics Short**—And prospects for a federally sponsored aviation training program of moderate size, aimed at providing needed trained workers for the airlines and the aviation industry, are being examined.

With many shortages felt in the mechanic picture, the federal training program might call for training of some 10,000 mechanics and 6,000 commercial pilots annually.

Success or failure of any such program in Congressional legislation would depend first of all on Department of Defense approval of the program and recognition that it would tap manpower which was not qualified for military service.

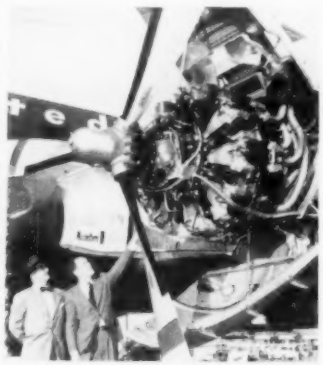
The program would also require civil aviation agencies' approval and sponsorship along with that of the industry groups who would benefit from manpower thus trained.

► **Training Problem**—Harry B. Pickering, chief of CAA Schools and Training division, forecast that 35 of the existing 46 private schools now operating are likely to close in 1952 for lack of students. He stated that five of the schools now have 70% of all non-veteran students in training. The slump in training is attributed largely to Selective Service and the fact that students are not enrolling because they expect to be drafted and will not be deferred.

With GI training already virtually completed, there will be no replacements for the 4,161 veterans now in aviation schools. There are only 793 non-veteran students now in private mechanics schools.

► **Needs Outlined**—Air Transport Association says the scheduled U. S. airlines will need 11,000 more certificated aircraft and engine mechanics by 1954.

Aircraft Industries Association sets the need for aircraft engineers in this country at 60,000 a year. This compares with a total of 38,000 engineering graduates in 1951, and an expected 26,000 in 1952. Continuing downward trend is expected to show a total of only 17,000 graduates in 1954. Meanwhile, this contrasts, according to Adm. D. C. Ramsey, AIA president, with the current output of 100,000 engineers and technicians a year manufactured in Russia.



NEAT POWER PACKAGE

Power package of first production Convair 340 provides 2,400 hp., yet it's easy to work on because of full-opening orange peel cowling, as Convair service engineer Richard Parsons shows United Air Lines station manager Phil Sharp. United will get 40 CV-340s, supplementing its DC-3 fleet and later replacing part of it. Note exhaust leads into jet stack opening (top right).

Aviateca Extends Services to Honduras

(*McGraw-Hill World News*)

Guatemala City—Aviateca, the government-controlled line serving internal points in Guatemala, has extended its services to neighboring British Honduras.

In spite of strained relations between the Crown Colony and Guatemala due to claims of sovereignty over the territory by the latter, British authorities granted a six-month permit to Aviateca to fly once weekly from the Guatemalan Caribbean port of Puerto Barrios to Belize, capital of British Honduras. Requests for permits for daily service were refused.

DC-3 combination passenger and cargo equipment is used by Aviateca. It is expected that considerable air cargo trade will be established between the two Central American areas, providing diplomatic relations between Guatemala and British Honduras do not worsen.

Get in the Scrap—Turn Yours in for Defense

SHORTLINES

▶ **Scandinavian Airlines System** plans trans-Atlantic air coach fares starting May 1 from New York at roundtrip prices of $536 Stockholm, $590 Helsinki, $495 Copenhagen, Oslo and Hamburg. . . . Has eight DC-6Bs on order, of which two are reportedly promised in time to start trans-Atlantic coach operation May 1.

▶ **Silver City Airways**, British trans-Channel air ferry airline, has ordered six specially built Bristol airfreighters. nose is elongated 4 ft., 10 in. to carry three small cars instead of the former two; it also will carry 20 passengers with the cars instead of 12. "The Silver City order is the largest ever placed by any postwar (British) free-enterprise airline," says SCA.

▶ **Western Air Lines** pilot contract gives pilots mileage pay of 1½ cents a mile in addition to 1½ cents for every 1,000 lb. of gross aircraft weight flown per hr. Copilots will get paid in proportion to captain's pay, as called for in most other recent pilot contracts.

▶ **Trans-Air Hawaii** has bought a 10,000-lb. payload, all-stainless steel Budd Conestoga airfreighter; plans to buy more if it proves out on the inter-island freight service. . . . Has also bought the Hawaiian School of Aeronautics.

▶ **Transocean Airlines** has transferred its domestic unscheduled passenger Martin 2-0-2 facilities to the Japan Airlines-Northwest Airlines operation in Japan, under contract operation by Transocean.

▶ **United Air Lines** has won a U.S. Circuit Court of Appeals stay against a CAB order for UAL to suspend service to Rock Springs, Wyo. Next step is a hearing before the Chicago court. Company maintains involuntary suspension of service is illegal. . . . Has placed full page ads explaining that it is not subsidized, points out that the Post Office gets $1.75 in revenue for every 45 cents a ton-mile paid the carrier. . . . Has rewarded Pilot Captain T. S. Jobson $1,000 for a proposed reroute of IFR southbound DC-6 flights out of Portland.

▶ **U.S. Airlines** expects Defense Department to say military passenger operation by U. S. would be an asset to defense; CAB turned down the carrier's earlier plea for permission to operate military contract flights, as an earlier Defense Department note said there was "no substantial need" for it. U. S.

70,000 ft.
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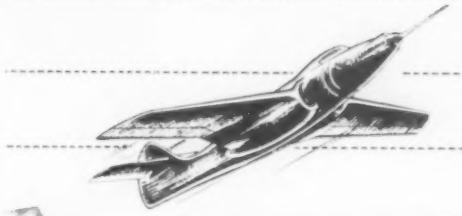

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From altitudes of 30,000 feet—then to 40,000 feet—and now to 50,000 feet and higher, Stackpole has set the pace in aviation generator brush dependability. The same revolutionary principles that enabled Stackpole to increase high-altitude brush life more than 50 to 1 during World War II have steadily been improved, refined and adapted for long-life commutation at higher and still higher altitudes.

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Typical of Stackpole high-altitude brush progress is the fact that, on certain applications, current densities of 500 or more amperes per square inch can be carried for short periods on Electro-Graphitic brushes. Normal industrial brush uses seldom call for more than 75 amps. per square inch!

STACKPOLE CARBON COMPANY, St. Marys, Pa.

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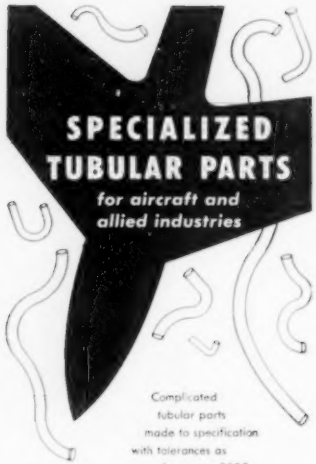

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is trying to earn a little working capital with which to survive long enough to make its all-cargo service pay.

▶ **Robinson Airlines** has appointed Farquhar & Co., Utica, N. Y., as its advertising agency.

▶ **Seaboard & Western Airlines** reports it lifted 26,829,485 ton-miles commercial and military air freight over the Atlantic and Pacific in 1951—almost three times a year ago. Seaboard notes as significant a shift on the Atlantic to U. S. imports exceeding exports by 3%; Seaboard's eastbound Atlantic air freight used to exceed westbound (U. S. import) traffic.

▶ **Southern Airways** carried 96,572 passengers in 1951, up 255% over 1950.

▶ **State Department** has ordered personnel to fly between countries to save money. State pays expenses of $6 a day plus regular salaries during personnel travel—which adds up to cheaper travel by air than boat on the Department's expense accounts.

▶ **Trans-Canada Air Lines** has lowered fares 7% on trans-border flights to U. S. and abroad because the Canadian dollar has risen to parity with the U. S. dollar.

▶ **TPA Aloha Airline** has signed a one-year contract with stewardesses; they belong to the AFL Machinist Union. Contract gives them a 6% pay increase.

▶ **Trans World Airlines** reports domestic TWA traffic up 25% the first half of January. . . . Offers an all-inclusive $695 two-week tour to London and Paris. . . . Airline says its 1951 advertising reached a potential of one billion readers and radio listeners.

▶ **United Air Lines** reports flying 6¼ million miles on the Pacific airlift in 18 months since the Korean war started . . . UAL this month will schedule 30% more daily seat miles than it had a year ago on commercial routes. . . . Operates 76% of its daily seat miles with DC-6s. . . . Expects delivery of its first Convair-Liner 340 in March. The 40 on order cost $23,117,000.

▶ **Wiggins Airways**, in its certificate renewal hearing before CAB Examiner Vernon Radcliffe, argued that failure to renew would "ring the death-knell of airline service for all but the biggest New England cities." Wiggins said Northeast only wants the big cities and "the sad history of local passenger service" shows what happens when a carrier is "doing a job reluctantly and for reasons of expedience."

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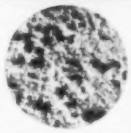	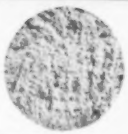

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CO-PILOT WITH valid multi-engine Commercial Pilot's Certificate and Instrument Rating. At least 500 hours with DC-3 experience. Unmarried. For excellent position with small overseas airline. Reply in detail to P-3097, Aviation Week.

INSTRUCTOR OR Assistant Professor in Aeronautical Engineering to teach Theory of Elasticity, Experimental Stress Analysis and allied subjects including Courses at the graduate level. Requires at least Master's Degree; teaching experience desirable. Location Philadelphia. Position permanent beginning March 1952. Include small photo with application. P-3025, Aviation Week.

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POSITIONS WANTED

AIRPORT OPERATOR, 45, Commercial Pilot, A&E, Rigger, Instructor, College Graduate, Executive Experience, married, needs job. PW-3223, Aviation Week.

(Continued on opposite page)

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in Field Service Engineering

- Air Force experience desirable.
- Personable, resourceful, A. & E. men with several years aircraft installation and or maintenance experience.
- Extensive travel required.
- Instructional ability essential.
- Long range program in new, interesting field.

Submit resume to

FLIGHT REFUELING, INC.

P. O. Box 709, Danbury, Conn.

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(Continued from opposite page)

COMMERCIAL PILOT. 8000 hours all ratings. Married. Age 38. Former NATS plane commander experience on B-17s, DC-3, DC-4. Available now. PW-3198, Aviation Week.

EXECUTIVE CO-PILOT Mechanic: 15 years military and civilian accident-free experience. Competent to take complete responsibility for the maintenance of aircraft. Commercial Flight Instructor, Single, Multi-Engine, Instrument, A&E, Flight Engineer. PW-3255, Aviation Week.

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Mechanics Manual (by Zweng) prepares you for your rating. Latest Multiple Choice Examinations with material not found elsewhere—including latest CAR, weight and balance and prodedure governing repairs. $4.00. Flight Engineer (Zweng) $4.00. Aircraft Dispatcher $4.00; New Aeronautical Navigation by Charles A. Zweng (examinations included) only $2.00; Link Instructor Manual (Zweng) examinations included $3.00; Zweng Aviation Dictionary $6.00 (Free Catalog). Pan American Navigation Service, 12021-A1 Ventura Blvd., N. Hollywood, California.

FOR SALE

Beechcraft D-18, Serial

402/733-143, twin 450H, P&W engines, 24 volt, American Aircraft Corp., HA-8-0278, Teterboro, N. J.

Douglas C-47, Cargo

Serial 1851, 6000 S.T. 24 volt, 2000 P&W R-1830-92, complete radio equipped. American Aircraft Corp., HA 8-0278, Teterboro, N. J.

Executive Twin Beech

18D in excellent condition, licensed for eight, reclining airline seats, VHF radio, ADF, 125 hours since overhaul. Spotless inside and painted. 206 gallons. $28,000.00. Jack A. Rodgers, 1486 Archwood Avenue, Akron, Ohio. Phinecon 5221.

Lockheed Lodestar.

powered Pratt and Whitney 1830-92 engines. Total time 3000 Hours. Originally converted at Lockheed Factories. Ship is now available for immediate sale. Call or wire Leeward Aeronautical, 3104 Chamber of Commerce Building, Miami, Florida. Telephone 9-1218.

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Immediate delivery. Very low total hours since major overhaul. This aircraft flown in less than sixty days ago. Now ready for immediate flyaway. Can be inspected at Butler's Washington National Airport. We own this airplane, call or write Leeward Aeronautical Service, 3104 Chamber of Commerce Building, Telephone 9-1218, Miami, Florida.

Lodestar airline Interior.

Serial 2445, 2565 S.T. 24 volt, 2000 HP, Wright R-1820-87, 100-30 & 950-20 SCH, 24 volt, no corrosion. Inspection at Teterboro, New Jersey, American Aircraft Corp., HA-8-0278, Teterboro, N. J.

Lodestar airline Interior

Serial 2445, 2565 S.T. 24 volt, 2000 SCH, Wright R-1820-87, 12 & 32 SCH, 24 volt, no corrosion. Inspection at Teterboro, New Jersey. American Aircraft Corp., HA-8-0278, Teterboro, N. J.

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STATION AGENTS & MANAGERS

Wanted for growing airline. 40-hour week. Stated working conditions. Complete details of past working experience and salary should be sent to

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Aggressive organization, contractual and technical background, 12 years experience in negotiating and administering all phases of Air Force contracts at Wright Field. Quality representation of your interests will materially benefit you whether you are seeking business or desire capable assistance in contract administration. Call, wire or write

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we offer training for a real money-making job in helicopter piloting and maintenance.

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we have reliable equipment with experienced crews available for lease anywhere.

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1375 square feet including air conditioning, lights, heat, janitor service. Two furnished metal, clear-glass partitioned offices, 200 square feet—300 square feet, balance free space. Outside windows on two sides—beautiful view. (Additional 13 x 17 adjoining office space optional.)

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FR-3171, Aviation Week
330 W. 42nd St., New York, N. Y.

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Have a career in commercial aviation with one of the country's leading airlines.

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(Additional For Sale Ads on pages 62 & 63)

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Late serial (2537)—just converted to plush executive Lodestar. Interior lighting in cabin—special plush lavatory—six chairs—divan—desk—hat rack—folding tables—dual fuel system—complete VHF and Omni—recent airframe overhaul—new zero time engines—one of the very greatest planes of its type.

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(Now receiving complete overhaul prior to modification. Can finish to customer's specifications.)
1—EXECUTIVE LOCKHEED LODESTAR
(Now receiving complete overhaul prior to modification. Can finish to customer's specifications.)
for details:
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Additional Employment Advertising on pages 58, 59, 60 & 61

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LARGE MIDWEST CORPORATION FOR EXECUTIVE AIR TRANSPORTATION

Minimum requirements:

- High School Graduate
- 35 years maximum age
- 3000 hours total time
- Valid commercial license
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- Multiple engine water time very desirable
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Answers only to those who qualify for interview

P-3119, Aviation Week
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FAIRCHILD
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Positions now available for highest caliber personnel in the field of airborne automatic, electro-mechanical control equipment.

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New and expanding division of an established firm with 20 years of successful experience in the instrument field. Work involved deals with the manufacture and development of highly complex equipment of the most advanced type.

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Engineers not now employed in defense industries are urged to make immediate application with full personal information by writing to Personnel Dept. of

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Staff position open to well qualified engineer for development of electro-mechanically operated aircraft instruments. Engineering degree plus experience in this field a prerequisite.

Fine opportunity to grow with a young, progressive organization, directed by an alert engineering management and ownership.

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Bell Helicopter Pilots — Mechanics

For eleven helicopter survey operation in Alaska, families included. High wages—bonuses—expenses paid. Pilots must have 200 hours. Mechanics with helicopter experience preferred but may take a few A. & E.'s as trainees. Employment contracts granted.

Our firm is largest in the business and entirely reliable. After summer in Alaska operation is moved to Los Angeles for year round operation. Employment permanent for those qualified. Opportunities for advancement.

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To Develop and Direct Program Covering Design-Productibility and Cost Analysis

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Phone 78-0491

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Kaman Aircraft has pioneered a number of important helicopter developments, including the first fully servo-controlled helicopters to go into production for commercial and military uses. Now Kaman scores again; this time with the first turbo-rotor helicopter.

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Send detailed resume to

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Rapidly expanding company requires design engineers for their Project Group. Should have extensive design experience in the gas turbine or allied field.

Extremely interesting work with small compressors and turbines, including gas turbines, on the design of aircycle cooling equipment and controls for major military & civilian aircraft.

Applicants should have a first class technical and practical background in thermodynamics, fluid mechanics and heat transfer with a decided preference for design work.

New Plant under construction, is ideally located on the south shore of Long Island.

All our products have peacetime application in Commercial Aviation

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GOODYEAR AIRCRAFT

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Salaried positions with accompanying liberal employee benefits and bonus for extended work week are open to

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for
DESIGN AND DEVELOPMENT
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Personnel are needed in the following classifications:

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Previous experience and formal education desirable. However, applicants without formal education but with equivalent practical experience in other engineering fields will be given consideration.

You are invited to investigate these opportunities by submitting a resume of your qualifications and experience or by simply sending for an application either of which will be given prompt and serious consideration.

Address all correspondence to

Mr. C. G. Jones, Salary Personnel Department

GOODYEAR AIRCRAFT CORPORATION
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Leading manufacturer of electrical and mechanical devices for both government and commercial applications now selecting engineers for:

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FOR
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Prefer man with B.S. in aeronautical engineering and 4 years experience in aerodynamics, 2 of them in the helicopter field.

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Prefer man with B.S. in aeronautical or mechanical engineering and 4 years experience in dynamics, 2 of them in the helicopter field.

Interesting work and ideal conditions with leading firm.

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For research and development work on balloons. Prefer advanced degrees or equivalent experience in one or more of these areas: Communications, Instrumentation, Telemetering, Servo-mechanisms, Low Temperature Work, Flight Operations, or related problems. Salary commensurate with qualifications. Liberal employee benefits, including moving allowances. Submit details of background to:

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UNUSUAL OPPORTUNITIES IN CONNECTION WITH DESIGN AND DEVELOPMENT OF WORLD'S LARGEST SUPERSONIC TEST FACILITIES.

Transfers to Operational Positions Available at Later Date as Construction Progresses.

IMMEDIATE POSITIONS AVAILABLE FOR AERONAUTICAL ENGINEERS OR PHYSICISTS WITH SOME BACKGROUND IN TRANSONICS, SUPERSONICS, OR HYPERSONICS.

Positions Also Available For Mechanical, Electrical, Structural, And Instrumentation Engineers.

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Consulting Engineers
Established 1928
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choose your area of specialization at Minneapolis-Honeywell

Minneapolis-Honeywell Regulator Company, the leader in the field of automatic controls and instrumentation, is presently engaged in research and design work in the areas listed below in both the aeronautical and general engineering divisions. Much of this work borders closely on so-called "pure" or "basic" research.

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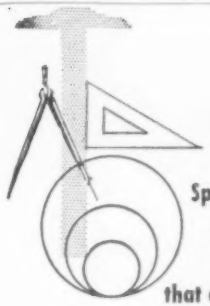

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Please send me *FREE* booklets describing the Convair Opportunity for me and my Convair Application Form.

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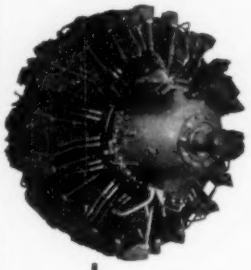

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TWO EXECUTIVE AIRCRAFT

DC-3 NOW IN CONVERSION C-47

BEAT RAIL AND AIRLINE SCHEDULES WITH

SAFETY—COMFORT—SPEED

New PWR 1830-75 Engines
Electric Shutoffs and Boosters
Fire Detectors, Aeroquip Lines
New Blow Proof Oil Coolers
New Tires, Boots, Batteries
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Collins 17L-51R VHF Omni
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DOUGLAS C47'S

CONVERTED

28 PASS. FOLD-UP SEATS
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HAT RACKS — BUFFET
LOW TIME SINCE 8000 HR. OVERHAUL
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CAN BE INSPECTED

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VERSATILE AND RUGGED
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★ VERY LOW TIME
★ GOOD FABRIC
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PRICE $33,500.
POUNDS STERLING ACCEPTED
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New Sparkplugs

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L & H Supply Inc.
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2 ea. P.W. 1830-92-Engines
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Also

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We own and offer all parts listed — plus many thousands more — stocked in our Baltimore warehouse!

CARBURETORS! MAGNETOS! SPARK PLUGS!

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90	1685HAR	Holley carburetor
19	1375F	Holley carburetor
407	SF9LN-2 (manufacturer's part No. 10-12453-6 Spec AN9511)	Bendix Scintilla Magneto
42	SF5RN-12 (manufacturer's part No. 10-26170-1)	Bendix Scintilla Magneto
185,000	LS4AD1	Spark Plug (Aero)
30,000	LS-659A	Bendix Scintilla Spark Plug

SPECIAL GROUP!

Ideal for tear-down for parts

Quantity	Part No.	Description
328	PD12K10	Stromberg injection carburetor
236	PR48-A1	Stromberg carburetor
29	PR48-A2	Stromberg carburetor
31	PR48-A3	Stromberg carburetor

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Quantity	Part No.	Description
166	1045A	Bearing
500	3506	Flange
130	8288	Follower Ass'y
814	35814	Blower Ass'y
53	48362	Shaft
175	48363	Shaft
56	48392	Sump
390	48461	Gear
78	76936	Gear
1178	84289	Bearing
113	84487	Housing
77	84591C	Nose Housing
200	48350-D	Crankcase Ass'y
200	84083	Cylinder
100	84084	Cylinder
200	84085	Cylinder

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BEARINGS AIRCRAFT

Quantity	Part No.
18000	R3L-2
8000	R3L-R48
4000	KF4
3000	KF4H
30000	KP4R16-2
3300	KSFS
17000	BC5W11
28000	KS4A
34600	NR6L12
7000	38KD4
5600	RE3MR3
5000	F35-14

LEAR ACTUATORS AND SCREW JACKS

Quantity	Part No.
42	400AJ3
161	420 EC
160	420 DY
26	550 CD
14	550 CG
195	550 CP

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26,000 AN10-17 $\frac{5}{8}$" dia—2-9/64" long
4,800 AN12-26 $\frac{3}{4}$" dia—2-29 32" long
1,795 AN16-61 1" dia—6$\frac{3}{8}$" long

MISCELLANEOUS COMPONENTS

Quantity	Part No.	Mfg.	Description
45	AN4103-2	Clifford	Brass (Valve - U4785)
18	18597-2	Airesearch	Aluminum (Width 8") (Length 9")
120	MF9-713-15A	Vickers	Hydraulic
160	2E492E	Pesco	Fuel
700	TFD 8600	Thompson	Fuel Booster
125	D7818	Adel	Anti-icer
50	2P771-A	Pesco	Fuel Booster
250	AN4014	Eric Meter	Wobble (D-3)
600	1H960-K & KA	Pesco	Hydraulic
19	AN5531-1	G. E.	Tach. Generator
1000	AN5780-2	G. E.	Wheel & Flap Position Indicator
400	AN5780-2	Weston	Same as above
16	76B19	Lewis Eng.	Cyl. Head Temp.
10	46B2	Lewis Eng.	Air Temp. Ind.
11	47B21	Lewis Eng.	Temperature Ind.
12	47B22	Lewis Eng.	Temperature Ind.
20	47B23	Lewis Eng.	Temperature Ind.
16	47B24	Lewis Eng.	Temperature Ind.
10	76Z2	Lewis Eng.	Air Temp. Ind.
11	76B4	Lewis Eng.	Temperature Ind.
20	77C4	Lewis Eng.	Temperature Ind.
21	77C5	Lewis Eng.	Temperature Ind.
85	727TY72Z2	Weston	Left Wing Anti-icing
88	727TY73Z2	Weston	Right Wing Anti-icing
83	727TY74Z2	Weston	Tail Anti-icing
11	2227-11D-3A	Eclipse	Dual Tachometer
44	5BA95D34B	G. E.	DC Motor (1½ HP)
83	A4934	Delco	Motor
50	RDB9220	Holtzer Cabot	DC Motor
49	FD65-5	Diehl	Motor
47	FD65-6	Diehl	Motor
116	A371205	Dumore	Motor
780	A371206	Dumore	Motor
115	P4CA2A	Parker	Primer
80	AN3213-1	Scintilla	Ignition Switch
450	A-9 (94-32006)	Nasco	Ignition Switch
687	RS-9	Mallory	Selector Box
90	JH950-R	Jack & Heintz	Starter Motor
499	S-841 (94-32053)	Electronic Labs	Box
53	AN6203-3	Bendix	Accumulator 10" 1500 P.S.I.
1000	13018-A	Bendix	Interphone Box
140	K14949E	Marquette	Winshield Wiper Kit
188	EYLC-2374	Barber-Colman	Control
11	12086-1C	Eclipse	Amplifier
174	450-0	Skinner	Gasoline Filter
250	558-1A	Eclipse	Oil Separator
100	716-3A	Eclipse	Generator (NEA-3A)
37	117-47	Edison	Detector
89	318	Edwards	Horn
20	794-F	Stewart-Warner	Heater
280	921-B	Stewart-Warner	Heater (20C000 BTU)
340	981280	Kidde	Co2 Cylinder
85	12924-E	Adel	Lock Valve
90	923748	Kidde	Oxygen Cylinder
80	DW28	Eclipse	Transformer
97	6041H-146A	Cutler Hammer	Relay (B-12)
22	0655-D	Aro	Oxygen Regulator
22	M-5031	Air Associates	Actuator
148	PG708AS1	Minn. Honeywell	Air Ramp Switch
33	DW43	Eclipse	Transformer
11	DW33	Eclipse	Transformer
55	ASDC2	CO2 Mfg. Co.	Fire Detector
750	ND91	American Gas Accumulator Co.	Time Delay Relay
30	UA6005-DV5	United Air Prod.	Oil Temp. Reg. 5"
29	UA-3160	United Air Prod.	Oil Temp. Reg. 6"
95	UA-3160C	United Air Prod.	Oil Temp. Reg. 8"
73	UA-6007-CF-DV5	United Air Prod.	Oil Temp. Reg. 7"
14	UA6009-5-30	United Air Prod.	Oil Temp. Reg. 9"
11	UA-6012K-520K	United Air Prod.	Oil Temp. Reg. 12"

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COCKPIT VIEWPOINT

By Capt. R. C. Robson

Radar Not Guilty

On Jan. 14, a Northeast Airlines Convair landed in the water near LaGuardia Airport during an instrument approach. At this writing there is no indication of the cause.

As usual, however, certain erroneous reports have received widespread circulation. Most damaging of these was a press story to the effect that radar was responsible. The purpose of this article is to show that this was impossible.

Several types of radar aids are available at most large airports, GCA, surveillance, PPI, etc. Each has its special function, but only one, the elevation scope of the GCA, contains altitude information. At LaGuardia this piece of equipment is focused on the ILS runway, Runway 4. The Northeast Convair made its approach from the opposite direction and therefore could not possibly have received altitude information.

The radar that was used to monitor the instrument approach was PPI, Plan Position Indicator. This, as its name implies, shows only the plan, or birdseye view, no altitude. Its function is to provide only distance and heading information.

▶**Newspaper Questions**—Editorials in several newspapers ask why the plane went out of view of the radar? Why wasn't the pilot told to pull up? And similar questions.

These are easy. The plane went out of view because it had gone below sea level—literally, and the pilot was not told to pull up because PPI does not contain altitude information. The first indication that anything was wrong was when the plane disappeared from the radar scope.

Because of these stories there were an abnormal number of refusals, by pilots at many airports, to use any radar guidance for several days following the accident.

It is true that radar has faults. What aviation device hasn't? But radar is coming into ever greater use because of certain good features. It should not be given a black eye for something it couldn't have done.

Early reports, especially by non-aviation sources, should always be discounted. Only a fair hearing can determine the true cause of any accident.

Having landed at LaGuardia immediately prior to Northeast—and via the same New Rochelle approach—I have what might be called a personal interest in this case. For the benefit of readers of this column I will endeavor to present the facts as soon as they become available.

Wanted, An Air Force Question

A few weeks ago this author watched a television program called "Careers Unlimited." It was a recruiting program put out by the Air Force. A thin story was built around the equipment used by a jet pilot.

One episode was a visit to an aircraft factory where jet fighters were explained by use of models. At one point the speaker picked up a model and said, "This is our latest fighter, it is our answer to the MiG."

▶**Late Answers**—These few words struck home an embarrassing point. It seems that the United States is always looking for an answer to an enemy fighter at the beginning of each war. In World War I it was an answer to the German Fokker, later it was an answer to the Jap Zero, now we need an answer to the Russian MiG.

Isn't it possible, with all our professed aviation talent, to produce some questions? Then the enemy can worry about finding an answer for a change. This would seem to be a far happier arrangement for all Americans.

WHAT'S NEW

New Books

Skygirl, by Mary F. Murray, 256 pages, numerous illustrations, price $3.00 published by Duell, Sloan & Pearce, Inc., 270 Madison Ave., New York 16, N. Y.

This book provides the answers to how to become an airline hostess. It details the qualifications and the training, even tells how to apply. Prospective stewardesses are also told how they can test their qualifications.

Valuable features are the chapters giving brief histories of the major carriers and the air stewardess requirements of each. Even the equipment in use today is described. Miss Murray knows whereof she speaks—she was a stewardess with United Air Lines for several years, now is director of stewardess training at Boston's Aviation Training School.—EJB.

Telling the Market

GEC-1016 is an 80-page catalog summarizing General Electric's testing and measuring equipment for laboratory and production line use—some 130 devices. Also available from GE is a four-page bulletin, **GEA-5660**, covering electronic contour follower systems for machining irregularly shaped parts, using one-, two- or three-dimension tracers. Address General Electric Co., Schenectady 5, N. Y.

The Croning or "C" process of producing foundry molds and cores and latest production variations are treated in a 20-page booklet, **Bakelite Phenolic Resins for Foundry Molds and Cores,** available from Bakelite Co., Union Carbide & Carbon Corp., 122 E. 42 St., New York 17, N. Y. . . . **Cold headed parts** for military applications, including their design, are handled in Bulletin TL-64. Write Townsend Co., New Brighton, Pa.

Tarrytron time delays for aircraft and guided missiles are detailed in Bulletin T-2 issued by Diaphlex, a division of Cook Electric Co., 2700 N. Southport Ave., Chicago 14.

New Publications

CAA Statistical Handbook of Civil Aviation, 1950 edition is the fifth in the series of data compilations of civil flying including airports, federal airways, aircraft and airmen certifications, education and training, personal, business, agricultural flying, scheduled airlines operations, production, exports and accidents. There are hundreds of detailed charts and graphs to provide statistics on all the above activities in the U. S. for the years through 1950.

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AVIATION WEEK—FEBRUARY 11, 1952

ADEL DIV., GENERAL METALS CORP. 27
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Agency—Stedfeld & Byrne, Inc.

AEROTEC CORPORATION, THE 35
Agency—Heiling & Co., Inc.

AIR ASSOCIATES, INC. 24

AIRBORNE ACCESSORIES CORP. 8
Agency—Gray & Rogers Adv.

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Agency—Kudner Agency, Inc.

AMERICAN CHAIN & CABLE 29
Agency—Reincke, Meyer & Finn, Inc.

AMERICAN NON-GRAN BRONZE CO. 36
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COLORADO FUEL & IRON CORP., THE 24
Agency—Doyle, Kitchen & McCormick, Inc.

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Agency—Barlow Advertising Agency

DARNELL CORPORATION, LTD. 43
Agency—Rhea Advertising Service

DYKEM COMPANY, THE 41

ELECTRICAL ENGINEERING & MFG. CORP. ..... Third Cover
Agency—West-Marquis, Inc.

ELECTRIC AUTO-LITE CO., THE 37
Agency—Ruthrauff & Ryan, Inc.

FLYING TIGER LINE, INC. 48
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MANSEN MFG. CO., THE 53
Agency—Richard T. Brandt, Inc.

HYDRO-AIRE, INC. ..... Second Cover
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KAISER METAL PRODUCTS 53
Agency—H. K. Davis & Bro.

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Agency—Wallace Lindeman, Inc.

LEWIS ENGINEERING CO., THE 54

MINNEAPOLIS-HONEYWELL REGULATOR CO. ..... Front Cover
Agency—Foote, Cone & Belding

MYSTIK ADHESIVE PRODUCTS 46
Agency—George H. Hartman Co.

NORTH AMERICAN AVIATION, Inc. 44, 54
Agency—Batten, Barton, Durstine & Osborn, Inc.

PIASECKI HELICOPTER CORP. 27
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Agency—Rex Cedar Adv.

RYERSON & SON, INC., JOSEPH T. 41
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SCINTILLA MAGNETO DIV. OF BENDIX AVIATION CORP. 34
Agency—MacManus, John & Adams, Inc.

SCOTT AVIATION CORP. 49
Agency—Melvin F. Hall Adv. Agency, Inc.

SEARCHLIGHT SECTION 56, 57, 58, 59, 60, 61, 62, 63

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Agency—The Roland G. E. Ullman Organization, Inc.

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Agency—The Harry P. Bridge Co.

STACKPOLE CARBON COMPANY 55
Agency—The Harry P. Bridge Co.

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TOWNSEND COMPANY 42
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TUBE BENDS, INCORPORATED 56
Agency—Charles Palm & Co.

TUBE METHODS, INCORPORATED 7
Agency—John Miller Adv. Agency

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Agency—Fuller & Smith & Ross, Inc.

WICKWIRE SPENCER STEEL DIV., THE COLORADO FUEL & IRON CORP. 21
Agency—Doyle, Kitchen & McCormick, Inc.

ZIEGLER STEEL SERVICE CO. 55

SEARCHLIGHT SECTION
(Classified Advertising)
H. E. Hiltz, Manager

EMPLOYMENT
Positions Vacant 56-61
Positions Wanted 56-57

SPECIAL SERVICES
Contract Work 57

PLANES—EQUIPMENT
(Used or Surplus New)
For Rent 57
For Sale 57, 62, 63

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EDITORIAL

Magnificent

Mrs. Robert P. Patterson lost her illustrious husband in the tragic crash of a transport plane at Elizabeth, N. J., on Jan. 22. The nation mourned Judge Patterson, who had served his country well, including the responsibilities of Secretary of War. Thirty persons died in that accident—all 23 occupants of the Convair, including Mr. Patterson, and seven persons who were in their homes.

Emotions of indignation arose in the Elizabeth area, which had gone through two air transport crashes within its congested city limits in five weeks.

Mrs. Patterson learned that these emotions had reached such a peak that heartless accusations were being circulated about the pilot of the ship, which had

Mrs. Patterson

Mrs. Reid

gone out of control and crashed within a few seconds. It is understood that Mrs. Patterson asked the National Broadcasting Co. for permission to broadcast an appeal to the public for fairness.

Her message was transcribed and broadcast Jan. 31 from WNBC. This was her message:

"Before I make my appeal to you I would like to thank everyone, including the wonderful families of the victims of the crash, for the outpouring of feeling which has given us courage.

"I appeal to you with all my heart to use this inexhaustible flood of sympathy and strength to give moral support to the widow of Capt. Thomas John Reid. He was the courageous and competent pilot of the plane that crashed at Elizabeth on Jan. 22, killing everybody aboard and some who lived near the scene of the accident. Their home is 611 South Broad St., Elizabeth, N. J.

"Besides her other troubles, Mrs. Reid has had to bear wickedly foolish rumors blaming her husband for the accident, and she is now in the hospital. It seems impossible that anyone could be so ungenerous and inhuman.

"The favorite toast of the people who fly is 'happy landing.' We must face the fact that the landing is in God's hands. The power of your good wishes will give her back her serene courage and fill her with increasing pride in her husband. She needs all her confidence to comfort her daughter, Randi, who will be four on Aug. 14, and her daughter, Robin, who will be two on July 23, and the baby which is due the end of July.

"She has the responsibility for three dear children who have been robbed of a loving and steadfast father, and she needs your help to pick up her family life proudly and happily."

Aviation's history is replete with heroes and heroines, and their sacrifices. Mrs. Patterson's deed will take its place with the greatest of them.

Aviation salutes a magnificent woman.

To Censor or Not?

The 60-day experimental period of voluntary censorship AVIATION WEEK began Dec. 10 on the subject of the Air Force's secret intercontinental XB-52 bomber has expired.

As the deadline for this issue passed, the editor had not completed a series of talks with various government officials in Washington on the subject of the experiment, and whether they believed it was worth continuing.

We found, to our amazement, that there was keen reluctance on the part of officials to talk about the subject on the record, and up to deadline no one in the government, even those who had been most critical of the press for "revealing secrets," had been found who urged us to continue this experiment. This was a baffling experience, to a staff that has heard so much criticism for what it has published.

Until we can complete our survey, therefore, we are maintaining our own strict voluntary censorship on material concerning this secret bomber, that Air Force Secretary Finletter officially requested the press to consider as a classified object in an appeal about Dec. 1.

In the meantime, Life Magazine appeared last week with a two-page color spread, including a drawing of the big bomber. The picture had been cleared with security review, we were told last week in Washington, but the caption material was not cleared.

What Goes On At CAA?

Civil Aeronautics Administration put into effect last week "changes in the organization of aviation safety." CAA people have been down-graded, up-graded, and transferred all over CAA's vast network.

In our opinion, this new setup is not in the best interests of aviation, CAA itself, the Commerce Dept., or the public, and we cannot give it a vote of confidence. We do not have faith in the integrity, technical or other abilities of some of the individuals who are high in the revised aviation safety setup. We do not like the organizational setup for various reasons which we shall probably make known. We welcome comments from our readers on this vital subject.

—Robert H. Wood

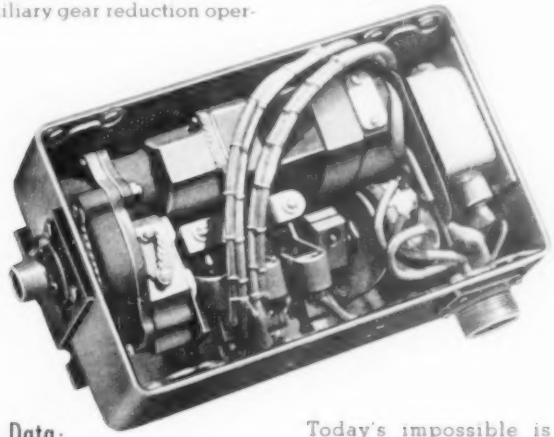
EEMCo technical bulletin

Rotary Actuator Package Advances Automatic Flight

This entirely self-contained rotary actuator package designed and built by EEMCO, combines compactness, high performance, and light weight.

Totally enclosed in a metal box equipped with mounting bracket, it incorporates motor, magnetic clutch and spring-loaded brake. Main gear reduction operates output drive shaft. Auxiliary gear reduction operates three adjustable limit switches — two for limiting travel, one for neutral position indication light. Auxiliary reduction also drives potentiometer for position indication.

The unit provides continuous elevator correction on one of the latest jet fighters through the automatic pilot.



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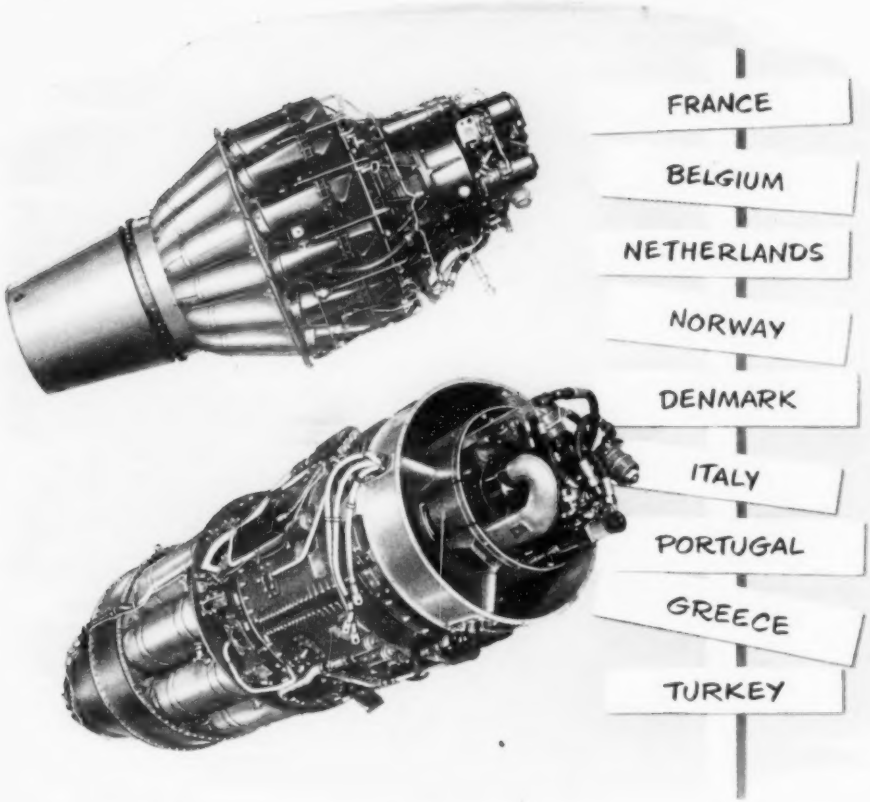

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ONCE again, our Armed Services depend on Allison for jet engines to fill a critical need. Just as Allison engines were standing by for immediate duty in Korea, Allison-powered aircraft were the *first* to be sent abroad to re-arm the air forces of many European countries.

Our Armed Services have flown more hours in the air with Allison engines — more than 1,300,000 — than with all other jet engines combined. It is natural then that they should draw on Allison-powered Lockheed T-33 trainers and Republic F-84 Thunderjets when a new need developed for engines which are available *now*.

Today, Allison engines are depended upon for a major role in the military planning for the air defense of our country as well as powering trainers and fighters for the air power of nations which are our allies in a mutual pact against aggression.

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